



Defense

AT&L

Acquisition, Technology and Logistics

A PUBLICATION OF THE DEFENSE ACQUISITION UNIVERSITY



Balanced Scorecards for Supply Chain Management

Cross-Service
Collaboration Yields
Efficiencies for
Diminishing Resources

If Only Our Training
Could

How to Improve DoD-
Industry Collaboration

The Ethical Imperative
and Courage to Cancel

All Aboard! Earned
Value Management
in DoD

CONTENTS

2

8



Balanced Scorecards for Supply Chain Management

Cassandra E. O'Neill and Scott S. Haraburda, Ph.D.

An Army ammunition activity shifts operational processes from logistics concepts to the flexible, robust approaches of Supply Chain Management.

Cross-Service Collaboration Yields Efficiencies for Diminishing Resources

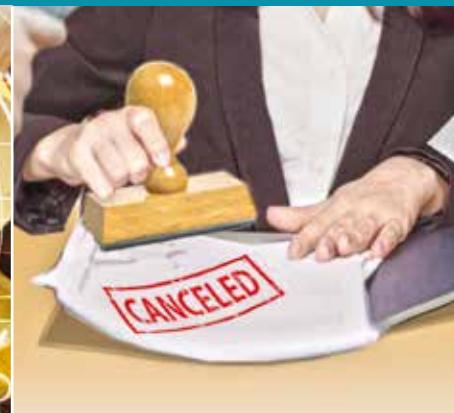
Jay Mandelbaum, Tina M. Patterson, Chris Radford, Allen S. Alcorn and William F. Conroy III

Proactive management can reduce the problems of diminishing manufacturing sources and/or of material shortages.

13

16

21



If Only Our Training Could

Brian Schultz and Jeffrey W. Megargel

A new workshop developed by the Joint Program Executive Office for Chemical and Biological Defense and the Defense Acquisition University aims at broader training for program teams.

How to Improve DoD-Industry Collaboration

Mandate It and Make It a Mindset

Lt. Col. Douglas B. Ogden, USMC

Innovation as a key in defense acquisition can be enhanced by maximizing stakeholder collaboration in developing new requirements, products and solutions.

The Ethical Imperative and Courage to Cancel

Eugene A. Razzetti

To ensure mission success and the safety of warfighters, some acquisition programs call for us to "either make it work or make it go away."

27

30

EARNED VALUE MANAGEMENT SERIES



All Aboard! Earned Value Management in DoD

John McGregor, Karen Kostelnik and David Nelson

A key office under the Secretary of Defense aims to increase the constructive attributes of Earned Value Management by increasing its efficient use.



Integration Engineering and Critical Infrastructure Resilience

Don O'Neill

Emergence of the Internet as our central information system has placed at risk the U.S. industrial base's security, creating a challenge of system-of-systems resilience.

35

39



How the Electronic Procurement System Ate the Acquisition Elephant

Jeffrey Bernhard and Mary K. Caffrey
Sometimes a steady, incremental approach to an Acquisition Category I program is the best way to streamline and modify the process.

The Quadrennial Defense Review—and Cyberspace

Jennifer Miller, D.B.A.

The Air Force Planning, Programming, Budgeting and Execution process faces a possible shift on core missions, increasing emphasis on cyberwarfare, and continuing high demand for cyber talent.

ALSO

42 The Acquisition Problem at Our Founding

DAU's research director and executive editor of the *Defense Acquisition Research Journal* wrote a study about the international acquisition strategy of the American Revolution. His book was a finalist for the 2017 Pulitzer Prize in history.

44 Letter to the Editor

44 MDAP/MAIS Program Manager Changes



Defense AT&L

Vol XLVI

No. 4, DAU 257

Published by the
DEFENSE ACQUISITION UNIVERSITY

Performing the duties of Under Secretary of Defense for Acquisition, Technology, and Logistics
James A. MacStravic

DAU President
James P. Woolsey

DAU Chief of Staff
Joseph Johnson

Director, DAU Operations Support Group
Leo Filipowicz

Director, DAU Visual Arts and Press
Randy Weekes

Defense AT&L Editorial Staff

Managing Editor/Senior Editor, DAU Press
Benjamin Tyree

Art Director
Tia Gray

Online Content Editor
Collie J. Johnson

Copy Editor/Circulation Manager
Debbie Gonzalez

Production Manager
Frances Battle

Editorial Support
Noelia Gamboa
Michael Shoemaker

Online Support
Nina Austin

Article preparation/submitting guidelines are located on the inside back cover of each issue or may be downloaded from our website at <https://www.dau.mil/library/defense-atl/p/Writers-Guidelines>. Inquiries concerning proposed articles can be made by e-mail to dat@dau.mil or by phone to 703-805-4282 or DSN 655-4282.

Subscribe/unsubscribe/change of address: Fill out, sign, and fax or e-mail the subscription form in this issue, or download the form at https://www.dau.mil/library/defense-atl/lists/pagecontent/attachments/6/DATL_subscription.pdf.

Privacy Act/Freedom of Information Act

If you provide us your business address, you will become part of mailing lists that are public information and may be provided to other agencies upon request. If you prefer not to be part of these lists, use your home address. Do not include your rank, grade, service, or other personal identifiers.

Defense AT&L (ISSN 1547-5476), formerly *Program Manager*, is published bimonthly by the DAU Press and is free to all U.S. and foreign national subscribers. Periodical postage is paid at the U.S. Postal Facility, Fort Belvoir, Va., and additional U.S. postal facilities.

POSTMASTER, send address changes to:

DEFENSE AT&L
DEFENSE ACQUISITION UNIVERSITY
ATTN DAU PRESS STE 3
9820 BELVOIR ROAD
FT BELVOIR VA 22060-5565

Disclaimer

Defense AT&L magazine promotes the free exchange of ideas. The views expressed are those of the authors and do not reflect the official policy or position of Defense Acquisition University, the Department of Defense, or the United States Government. Articles are in the public domain and may be reprinted or posted on the Internet. When reprinting or posting, please credit the authors and *Defense AT&L*.

Some photos appearing in this publication may be digitally enhanced.

Balanced Scorecards

for Supply Chain Management

Cassandra E. O'Neill ■ Scott S. Haraburda, Ph.D.



For more than a decade, Crane Army Ammunition Activity (CAAA) has produced and provided conventional munitions to the warfighters, supporting them in winning battles in Iraq and Afghanistan. Its senior leaders continually strive to improve its logistics processes. Due to a rapidly changing environment, this Army Working Capital Fund organization began a dramatic transformation by replacing its operational processes, moving from the proven concepts of logistics to the more robust and flexible approaches of Supply Chain Management (SCM). Along the way, it had to renovate the way it measured its organizational performance. CAAA leaders now use this new balanced scorecard based upon SCM to make important organizational decisions.

Supply Chain Management

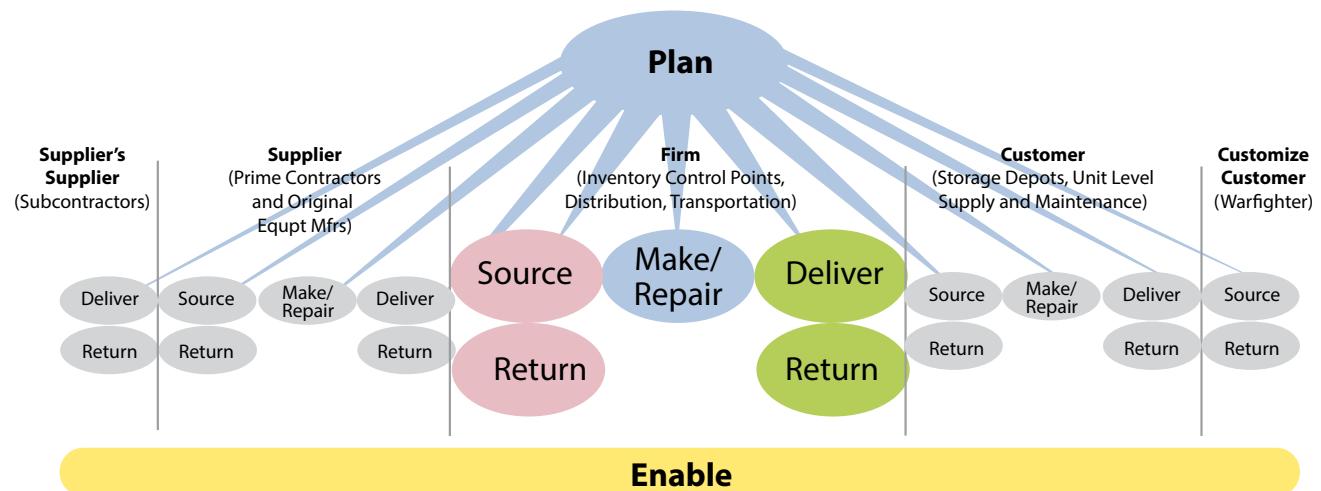


SCM has become a vital tool used in today's global economy to increase success and efficiency in the flow of products and services. The SCM process begins in the earliest stages of procuring materiel from distributors and suppliers, and it continues until the final delivery to the customer. The complete supply chain encompasses sourcing raw materiel and parts, manufacturing, warehousing, inventory management, customer service, and delivery of final product. Each element is critical for a fully developed, high-performing supply chain; one weak link can prove detrimental to the entire SCM process because all areas depend upon each other. SCM aims to collectively improve each stage of product acquisition, storage, development and delivery to ultimately maximize customer value and gain a more competitive advantage.

An established supply chain optimizes a business' operations by enhancing both speed and efficiency throughout the various stages, from obtaining raw materiel to delivering the final product. The collaborative efforts of the areas within the supply chain give companies a huge cost advantage due to the greater efficiency within each area of the organization. Advantages to implementing an effective supply chain include improved inventory management, better materiel distribution, higher visibility of assets, increased customer satisfaction, reduced waste, lower costs, predictable schedules, enhanced quality and better overall operational efficiency.

O'Neill is a Naval Surface Warfare Center-Crane Division contract specialist in Crane, Indiana. She holds a bachelor's degree in management from Indiana University-Purdue University Indianapolis and an MBA from Indiana Wesleyan University. **Haraburda**, a retired U.S. Army colonel, is the Crane Army Ammunition Activity Strategic Planner. He holds a doctorate degree in chemical engineering from Michigan State University and is DAWIA Level III certified in program management and engineering. He also is a certified Project Management Professional.

Figure 1. Phases of Military Supply Chains



SCM Implementation

An effective supply chain has a huge impact on an organization's profitability and customer satisfaction, and this leads to a greater need for SCM process improvement. SCM extends beyond traditional logistics to include suppliers and customers in the process, resulting in more involvement from outside stakeholders and better overall relationships. CAAA has begun initiatives to integrate a fully functioning supply chain system with the more engaging approaches offered by SCM.

CAAA uses the Logistics Modernization Program (LMP), an Enterprise Resource Planning (ERP) software program, to manage the Army's materiel, monitor and increase inventory accuracy, reduce cycle time of purchase orders, and improve overall business functions. By using this system, CAAA's supply chain team conducted extensive research and collected vast amounts of data to move SCM integration forward.

New innovative supply chain processes were cultivated by looking outside the U.S. Government to industry leaders. In the earliest stages of SCM development, CAAA used the American Productivity and Quality Center (APQC) for information about best practices, benchmarking, performance improvement and other areas. CAAA also used the American Production and Inventory Control Society (APICS) for information regarding its supply chain operations reference (SCOR) model, which linked business processes, performance metrics, best practices and individual skills into one structure.

Used throughout the Department of Defense (DoD), the SCOR framework is organized around six primary processes of plan, source, make, deliver, return, and enable. Because this model is used to improve and communicate supply chain goals and processes, it assisted CAAA with metric identification and arrangement. It also has been further developed to apply to a DoD supply chain. As seen in Figure 1, for military supply chains, each phase targets specific areas—and they repeat

again and again throughout the entire process. CAAA selected metrics reflected in this model that focus on a unified SCM process from supplier delivery to customer acceptance.

CAAA initiated a key initiative to establish effective performance-based metrics and created a balanced scorecard to measure supply chain efficiency. It used this balanced scorecard as a performance measurement tool to provide leaders a complete view of organizational performance across various mission and support areas. This was done primarily through modifying the project management dashboards originally developed by one of the authors, described in "Leveraging Fidelity of Performance-Based Metric Tools for Project Management," an article in the January-February 2003 issue of *Program Manager*, the predecessor of *Defense AT&L* magazine.

Identifying Supply Chain Metrics

Tracking supply chain metrics is always a strong starting point because the metrics allow organizations to identify weak areas and opportunities for performance improvement. Assisted by APQC information, CAAA identified an initial list of nearly 50 possible metrics to use in determining where an activity stands in terms of its SCM capability. Table 1 lists some of those metrics that focused on key performance indicators covering process efficiency, cycle time, staff productivity, cost effectiveness and other supplemental information. CAAA used the top quartile of industrial companies as benchmarked target values in its scorecard.

During the initial review, CAAA collected the appropriate data from the LMP database to analyze the activity's strength in the above key performance areas. CAAA leaders wanted to eliminate "Zombie Metrics" that were causing no action, even if they were easier to monitor. After completion of this initial assessment, the list was compressed to fewer than two dozen metrics to target the weakest areas, such as inventory management, supplier performance and schedule. Furthermore, the weaker links in the supply chain were paired with some of

CAAAs business critical metrics such as productivity, quality, customer satisfaction, and revenue and expense planning. The final metrics were arranged into the elements of supplier, input, process, output, customer, and foundation (SIPOCF).

Used in developing the balanced scorecard for the complete supply chain, CAAA's supply chain metrics were those composed of these SIPOCF elements, and used these in various process improvement projects. CAAA pushed the SIPOCF diagram a step further by adding a foundation category to help view the entire organization's base performance. Each group within the SIPOCF diagram consists of key metrics that measure specific areas within the supply chain and contribute to completion of the overall balanced scorecard.

The supply element consists of the significant internal and external suppliers to the process. In Fiscal Year 2015, CAAA had nearly 80 different vendors, both commercial and government, supplying more than 100 distinct components. The metrics used in this stage include Materiel Requirements Planning and product quality deficiency data. These supplier performance metrics are tied to key enterprise performance metrics and processes rather than a sole emphasis on establishing supplier performance targets without organizational considerations.

The input element consists of the materiel, resources, documents, information or any other significant data used to implement the organizational processes. CAAA measures its significant inputs by analyzing inventory turns, days of supply, supply planning, and demand and supply forecasting. Regrettably, many DoD installations—CAAAs included—have increasing inventory levels, which complicates the supply chain process

Table 1. Possible Supply Chain Metrics

Category	Metric
Process Efficiency	Raw materiel inventory turns.
Cycle Time	Time to place a purchase order.
Supplemental Info	Percentage of procurement group with more than 3 years of experience.
Staff Productivity	Number of purchase orders processed per procurement group full time equivalent.
Cost Effectiveness	Total cost to process outbound transportation per \$1,000 in revenue.

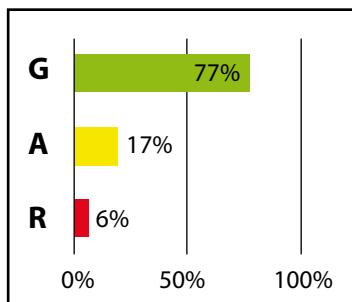
Source: American Productivity and Quality Center

and damages overall performance. Measuring and improving inventory management enhances supply and demand planning and the business' overall profitability.

The process element consists of the activities or procedures executed in an effort to convert inputs into outputs. The efficiency processes are measured through productive yield calculations, receipts and issues, inventory plan completion and scrap and rework costs. Process metrics allow CAAA leaders to examine operations and productivity levels across multiple functions.

The output element consists of items produced in the process phase and intended for customer use. Metrics include the effectiveness of their outputs through the quality of end items, the number of projects completed, the schedule, orders

Figure 2. Actionable Data From Supply Chain Metrics



Metric	Last Month	This Month	Rating	Trend
Safety-RIR	6.20	4.57	R	↑
Direct Labor Hours	97%	103%	G	↑
Revenue Plan	1%	-2%	G	↓
Expense Plan	-3%	6%	A	↓
Storage Occupancy	84%	84%	G	↔
Overall				↑

Issues

1. Issue 1 description (i.e., safety RIR).
2. Issue 2 description (i.e., expense plan).
3. Issue 3 description (i.e., revenue plan).

Action Plan

Who	When	What	Status
POC	Date	Address Issue 1	Status
POC	Date	Address Issue 2	Status
POC	Date	Address Issue 3	Status

Abbreviation Key:

RIR=Recordable Incident Rate
POC= Point of Contact

shipped on time, surveillance backlog and demilitarization execution. These provided leaders with an idea of the quality and timeliness of the various products generated by each project. Monitoring outputs also increases the visibility of process outcomes and provides an opportunity to continuously modify operating procedures to improve the quality and schedule of end products.

The customer element involves the recipient of the output from the process. CAAA has slightly more than two dozen different customers who receive its products. Metrics are applied to quality, timeliness and delivery. These impact future demand, ensure customer satisfaction, and identify opportunities to improve. These included customer feedback, especially their complaints. Perfect Order Fulfillment also is tracked to ensure products are supplied to the customer on schedule and meet all requirements agreed upon in the contract.

The foundation element refers to the enabling processes in the SCOR model. These metrics included such enabling processes as safety, direct labor hours, revenue and expense planning—along with storage occupancy levels.

Balanced Scorecard

Action-Based Reviews: At least once each month, the CAAA directors review actionable information determined from an effective analysis of their supply chain metrics. The monthly metrics reviews include quad-charts similar to the chart in Figure 2, one for each of the six SIPOCF elements. These reviews include Green-Amber-Red (GAR) colors along with trending arrows to indicate changes from previous reports ($\uparrow\downarrow\leftrightarrow$). The GAR colors are based upon the target goals, either established by the command or from the performance of companies through benchmarking target data.

In the upper left block, a horizontal bar chart is displayed that shows a percentage of elemental metrics in each of the GAR rating. The upper right block contains the data for each of the elemental metrics, including the value from the previous reporting period. The bottom left block provides a textual list of the top issues in the supply chain element. And the bottom right block, as the most important one in the review, identifies the action plan to address the identified issues.

Dashboard: CAAA integrates the six SIPOCF elements into an integrated dashboard, similar to the balanced scorecard used by the Malcolm Baldrige National Quality Award. This shows its leaders the status of its organization in a quick glance. Cost, schedule and performance are the overarching three key business indicators that, as in project management, are displayed on the top of this dashboard. The foundation element is displayed on the bottom and the remaining five elements are displayed in the middle in sequential order. As in the action-based reviews, each of the elemental bar charts includes a trending arrow. Resembling a hamburger, this dashboard looks like the notional one in Figure 3.

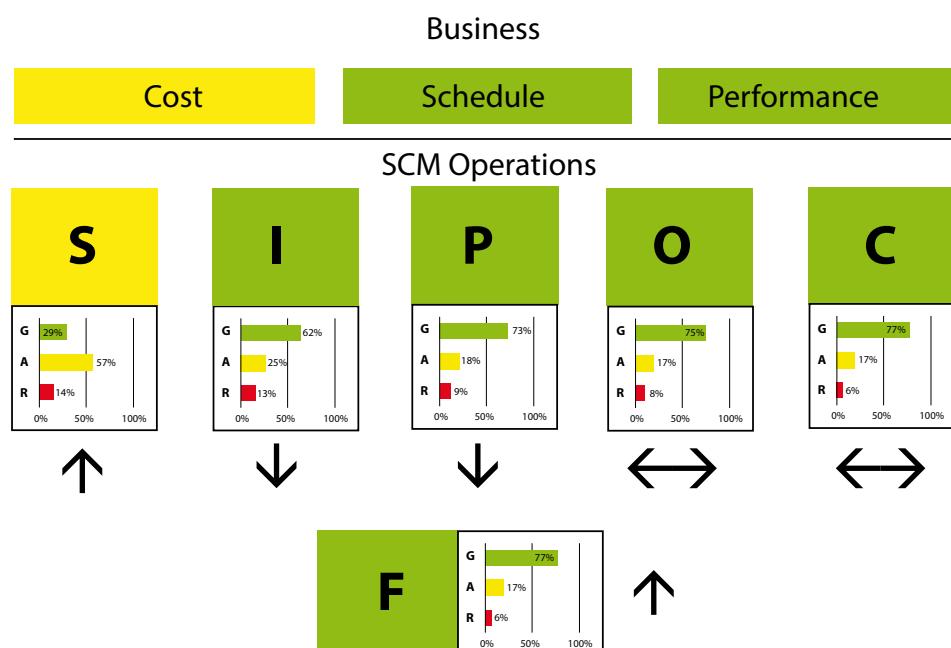
The Balanced Scorecard's Future

The balanced scorecard based upon SCM has developed into an integral part of CAAA's strategic and operational plans used by its leaders to make important organizational decisions throughout the month. It also provides a range of performance metrics that CAAA leaders use in making informed decisions involving supply chain design changes. Any organization, including service-oriented government agencies, can benefit by using a balanced scorecard of key performance metrics with industrial benchmarks in assessing organizational progress and identifying weaker links throughout its supply chains.

&

The authors can be contacted at cassandra.e.oneall@navy.mil and scott.s.haraburda.civ@mail.mil.

Figure 3. Supply Chain Dashboard (With Trends)



FREE ONLINE SUBSCRIPTION

Defense ARJ

Defense AT&L

Thank you for your interest in *Defense AT&L* magazine and *Defense Acquisition Research Journal*. To receive your complimentary online subscription, please answer all questions below—Incomplete forms cannot be processed.

*When registering, please do not include your rank, grade, service, or other personal identifiers.

- New Online Subscription*
- Cancellation*
- Change of E-mail Address*

Date

Last Name: _____

First Name: _____

Day/Work Phone: _____

E-mail Address: _____

Signature: (Required) _____

PLEASE FAX TO: 703-805-2917, or

E-MAIL TO: datlonline@dau.mil

The Privacy Act and Freedom of Information Act

In accordance with the Privacy Act and Freedom of Information Act, we will only contact you regarding your *Defense ARJ* and *Defense AT&L* subscription. If you provide us with your business e-mail address, you may become part of a mailing list we are required to provide to other agencies who request the lists as public information. If you prefer not to be part of these lists, please use your personal e-mail address.

S U B S C R I P T I O N

Cross-Service Collaboration

Yields Efficiencies for Diminishing Resources

Jay Mandelbaum ■ Tina M. Patterson ■ Chris Radford ■ Allen S. Alcorn ■ William F. Conroy III





Diminishing manufacturing sources and material shortages (DMSMS) remain a very significant issue for the Department of Defense (DoD), with significant resources committed to limiting the problem. Given the long lives of DoD systems relative to the items and technologies used to build and support them, DMSMS problems are inevitable. There is good news, however: Proactive DMSMS management can reduce the cost of resolving those problems.

How does proactive DMSMS management help? It's all about the window of opportunity to do something about emerging DMSMS issues. Proactive DMSMS management reduces cost by identifying issues as early as possible through a risk-based monitoring of items in the system. If a program does not discover a DMSMS issue until there is a failed attempt to buy an item, resolution options often are limited and usually only more expensive alternatives are feasible. Proactively identifying issues as soon as information about them becomes available usually increases the number of resolution options available and creates opportunities for an increased number of lower-cost alternatives because there is more time to fix the problem before an impact occurs.

This article illustrates DMSMS management efficiencies achieved via collaboration between the Naval Air Systems Command (NAVAIR) and the U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC). These efficiencies lead to greater team proactivity and ultimately to lower DMSMS resolution costs for the partnering organizations.

Mandelbaum was instrumental in developing ways to use value engineering to resolve obsolescence issues in the course of researching obsolescence policy, guidance, and training during the last 7 years at the Institute for Defense Analysis (IDA). **Patterson** also has worked for 7 years on obsolescence policy at IDA and earlier was similarly involved in the systems engineering field. **Radford** has more than 15 years of experience in Engineering, Logistics and Program Management within industry and the government, supporting aviation and ground support platforms. **Alcorn** has worked for more than 26 years with the Army's Aviation and Missile Research, Development and Engineering Center, and is currently Team Lead and Acting Chief of the Obsolescence Engineering Branch. **Conroy** has been a professor of Life Cycle Logistics Management and of Production, Quality and Engineering at the Defense Acquisition University's Mid-Atlantic campus in California, Maryland, since 2005.

The DoD guidebook, SD-22, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program*, (<http://www.acq.osd.mil/se/docs/SD-22-DMSMS.pdf>), provides comprehensive information for DoD Components on mitigating the risks associated with DMSMS issues. It defines DMSMS as "the loss, or impending loss, of manufacturers or suppliers of items, raw materials, or software." The SD-22 also defines DMSMS management as "a multidisciplinary process to identify issues resulting from obsolescence, loss of manufacturing sources, or material shortages; to assess the potential for negative impacts on schedule and/or readiness; to analyze potential mitigation strategies; and then to implement the most cost-effective strategy."

Cross-Service Collaboration

NAVAIR's DMSMS management team is the logistics technical authority responsible for the development, sustainment and execution of NAVAIR DMSMS and obsolescence management policy and processes. Its mission is to mitigate the impact of obsolescence and DMSMS issues on total ownership cost by providing relevant subject-matter expertise to NAVAIR program management offices. The AMRDEC Obsolescence Engineering team includes more than 40 engineers and researchers who develop obsolescence engineering strategies and constantly monitor products and parts availability issues. Since 1987, the team, located within AMRDEC's Engineering Directorate, has supported aviation and missile programs combating the ever-present threat of obsolescence.

Both collaborating organizations previously performed similar functions independently—they both apply tools and resources as part of their support to programs. For example, the teams' research functions:

- Facilitate the analysis of Bills of Materials (BOMs) using a suite of predictive tools primarily for monitoring electronic parts.
- Perform market research by contacting the applicable vendors to ensure that accurate data (e.g., points of contact, pricing, end of production, etc.) are obtained for mechanical and commercial-off-the-shelf (COTS) parts.
- Access the original equipment manufacturer and after-market manufacturer websites.
- Access federal supply sources such as Defense Logistics Agency (DLA), Land and Maritime, Standard Microcircuit Cross Reference, Qualified Products Database, as well as additional commercial tools.

The need for a centralized database and/or tool to facilitate these research functions and disseminate the results became evident as the number of programs supported by the NAVAIR DMSMS team grew. After evaluating a range of potential options, NAVAIR selected the Multifunctional Obsolescence Resolution Environment (MORE) tool-database to meet its

needs. MORE is a government-owned engineering analytical obsolescence and DMSMS management information system developed and maintained by AMRDEC. MORE centralizes work flow for researching the status of electronic parts; accessing availability data, analysis results, and discontinuance alerts; and compiling and disseminating of information gleaned from subject-matter experts.

While the possession of these capabilities influenced the selection of MORE, an even greater factor in favor of MORE was AMRDEC's willingness to truly partner with the NAVAIR team. Thus, cross-Service DMSMS management collaboration was born! The following illustrates examples of the synergies that have already been gained via this real-world joint, multi-Service DMSMS/obsolescence partnership.

Benefits of the Collaboration

During the first year of partnering, the MORE parts library increased in size by approximately one-third when NAVAIR parts were included. Further increases are anticipated because only a small portion of the total NAVAIR BOMs were loaded initially. Just from the perspective of NAVAIR alone, when these initial BOMs were loaded, more than 15 percent of the parts were already common to the AMRDEC and had been researched and were in the MORE library. This 15 percent likely will increase because many of the NAVAIR parts must be researched prior to a determination of whether they are in the parts library.

With an expanded parts library, there is a greater likelihood that any parts investigated by new AMRDEC or NAVAIR customers not only will already be in the library but can also be automatically researched. And this provides a significant time savings over a manual process. In fact, beyond the 15 percent commonality, many of the initial NAVAIR unique parts were automatically researched by MORE. Finally, the increase in the MORE parts library leads to an increased number of parts added to subscription tools that underlie MORE. Over time, this will increase the recognition rate of the parts libraries within the subscription tools.

NAVAIR Obsolescence Management Team Technical Lead Chris Radford says: "The MORE library when combined with the AMRDEC team provides a service and capability that no one else in the industry provides. It's a one-stop shop with a program designed around MORE that provides not only complete documented work instructions from part research to program management of DMSMS, but also a unique part auditing program that ensures that bad data and research are not added to the library, either willingly or unwillingly."

Radford added: "This is the key to a successful DMSMS program. No matter what tools you use, there is a high percentage of false data that exists. The MORE process is constantly reducing this bad data to ensure that its contents are more accurate than any other tool because the data is validated. This proactive management process is the key to

DMSMS cost avoidance based on program efficiency. Most programs are still searching for the individual part metrics hoping to save big dollars not realizing that the manpower costs they are spending to reactively solve these problems generally offset the costs saved. Good DMSMS programs don't save their customers money overnight—rather, they establish a consistent program that enables the customers to proactively manage all of their parts and systems and streamline future efforts."

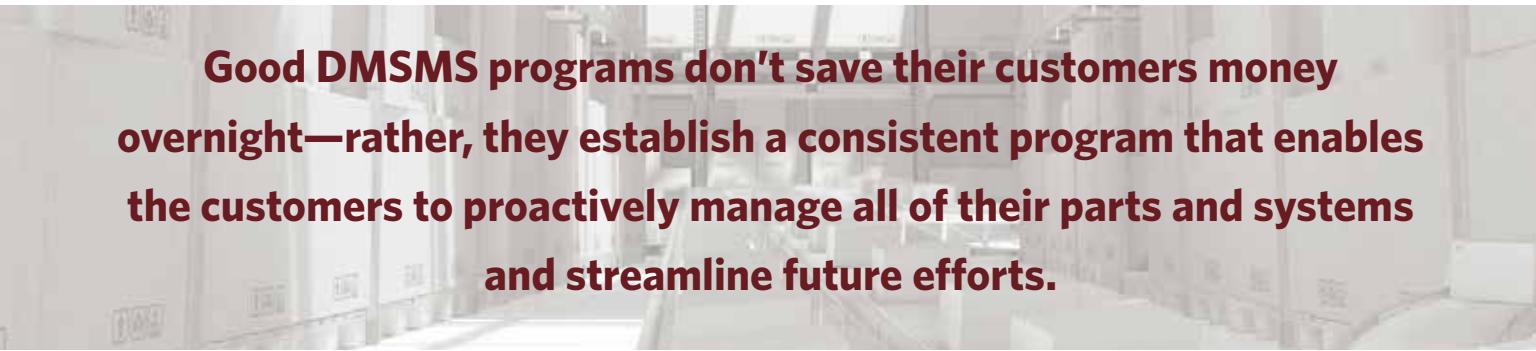
Both NAVAIR's and AMRDEC's proficiency have increased as a result of the collaboration. Although NAVAIR also uses other tools to facilitate the research and identification of alternate parts and part statuses, MORE leverages the information provided by those tools. It enhances and compares their outputs, thereby providing the user with more accurate parts availability statuses.

The AV-8B ground-attack aircraft program offers several examples of efficiencies already realized because of the partnership. The AV-8B leveraged AMRDEC DMSMS training documentation not only to train new staff on how to use MORE but also on how the parts research process works. The MORE

Instruction and is collaborating on requirements for a MORE Sustainment Module currently in development.

Michele Ozier, a team lead at AMRDEC, and, in particular, the AMRDEC lead for the NAVAIR collaboration, spoke of the mutual benefits of the combined efforts: "We at AMRDEC are excited to collaborate with NAVAIR. We believe that the resulting identification of commonality, standardization of processes, shared ideas, and synergy will be a great benefit to both organizations, and most importantly, to our customers—the warfighters."

MORE can also facilitate determining resolution options to DMSMS problems through a capability to view all platforms that are using a given part. Consequently, when a program office is trying to determine the most cost-effective resolution to a common problem, it can easily identify what other platforms have done and take advantage of those efforts. In addition, the ability to view all platforms that use a part can better enable a coordinated cross-Services programs approach to parts suppliers for resolutions, thereby increasing their leverage to either get the suppliers to continue manufacturing the item or provide



Good DMSMS programs don't save their customers money overnight—rather, they establish a consistent program that enables the customers to proactively manage all of their parts and systems and streamline future efforts.

partnership allowed the AV-8B team to streamline its obsolescence team, process and structure; it is now managed by a small core group, reducing costs from \$633,000 in Fiscal Year (FY) 2014 to \$290,000 for FY 2017. Jesse Powell, the AV-8B Obsolescence Manager, said: "Collaboration and leveraging existing processes and tools across the Services should be our Number One goal. We often spend too much time doing our job that we forget that there are other Services within DoD that may have already solved the problem. The Army and NAVAIR collaboration through the MORE tool is just one example of how we (all DoD) can work together to reach a common goal. The AV-8B program at NAVAIR has shown that collaboration can lead to saving for the program office, and I look forward to continuing this collaboration into the future."

AMRDEC's part research proficiency has also improved as a result of the NAVAIR addition of a large number of Military Specification (MILSPEC) items into the MORE database. In addition, NAVAIR input on AMRDEC processes helped to further refine and enhance MORE processes. Specifically, NAVAIR reviewed and provided comments on MORE's MILSPEC Work

an alternative. DoD's bargaining power can be further enhanced because a single supplier often provides multiple items to multiple DoD customers.

Taking Collaboration to the Next Level

The AMRDEC/NAVAIR collaboration in the use of the MORE tool represents just one of eight strategic objectives being pursued to expand collaboration across the whole DoD enterprise. Another of those objectives is commonality. The goal of this strategic objective is to demonstrate the value (including reduced costs, improved program schedule and other efficiencies) of a proactive DMSMS program leveraging information sharing. This objective was created in recognition of lost opportunities for common resolutions. Data sharing previously occurred only within a Service among the customers of the same independent DMSMS management provider, the users of common tools, or as a result of periodic meetings of various working groups. Sharing also occurred across DoD where common resolutions were developed for DLA-managed electronic items—or in rare instances,

such as tungsten-rhenium wire, when it was determined that an enterprise resolution was preferred.

A third strategic objective deals with the establishment of DoD centers of excellence. When a DMSMS problem occurs, resolution options are analyzed to determine the most cost-effective approach. The comprehensiveness of the analysis depends primarily on a program office's experiences with the capabilities of resolution providers. This experience is typically limited because program offices often choose only from the subset of potential service providers that they commonly work with. The goal of this strategic objective is to create an easy-to-use database of a large number of service provider capabilities that program offices can use to help determine the most cost-effective approach for resolving DMSMS issues.

These strategic objectives are only achievable through various forms of partnerships. The NAVAIR and AMRDEC partnership is not just one example but a first step. Robin Brown, the DoD DMSMS/Obssolescence lead said, "I want to make the case for us to build on this partnership to include not only all DMSMS management across DoD but also the resources that DMSMS practitioners rely upon to resolve problems." Benefits are already being witnessed through the NAVAIR/AMRDEC

partnership; therefore, it is credible that further benefits can be realized by expanding the collaboration further across the DoD enterprise.

Conclusion

While the Services use numerous unique systems and platforms, it is important to understand that many common components exist on these systems, regardless of function, application or the environments in which they perform. In the past, because of how programs are segregated and managed, these common parts were likely monitored and researched independently by multiple programs or not tracked at all. This has resulted in duplicated effort and inefficient use of resources. Collaboration, enabled by a centralized database, delivers benefits to all players involved in component research and mitigation by reducing time and cost and by utilizing a team of subject-matter experts (rather than a single person) to participate in reducing DMSMS risks. These efficiencies lead to improved proactive DMSMS management and thereby decreased DMSMS management and resolution costs.

The authors can be contacted at jmandelb@ida.org; cpatters@ida.org; christopher.radford@navy.mil; allen.s.alcorn.civ@mail.mil; and william.conroy@dau.mil.

We're Looking for a Few Good Authors

Got opinions to air?

Interested in passing on lessons learned from your project or program?

Willing to share your expertise with the acquisition community?

Want to help change the way DoD does business?

Write an article (1,500 to 2,500 words) and *Defense AT&L* will consider it for publication. Our readers are interested in real-life, hands-on experiences that will help them expand their knowledge and do their jobs better.

What's in It for You?

First off, seeing your name in print is quite a kick. But more than that, publishing in *Defense AT&L* can help advance your career. One of our authors has even been offered jobs on the basis of articles written for the magazine.

Now we can't promise you a new job, but many of our authors:

- Earn continuous learning points
- Gain recognition as subject-matter experts
- Are invited to speak at conferences or symposia
- Get promoted or rewarded

For more information and advice on how to submit your manuscript, check the writer's guidelines at <https://www.dau.mil/library/defense-atl/p/Writers-Guidelines> or contact the managing editor at dat@dau.mil.



If Only Our Training Could

Brian Schultz ■ Jeffrey W. Megargel

Could our acquisition training be focused on our program and involve our unique issues? Could the training be comprehensive enough to help our team with a critical task such as developing an Acquisition Strategy? Could program-specific Mission Assistance be provided when our team first needs it, like at the beginning of the acquisition life cycle or before

**"Tell me
and I forget.
Teach me and
I remember.
Involve me
and I learn."**
—Adage, Various
Attributions

Schultz is a professor in the Defense Acquisition University's Capital and Northeast Region at Fort Belvoir, Virginia. **Megargel** is a former Marine Corps Contracting Officer and industry program manager currently supporting the Joint Program Executive Office for Chemical and Biological Defense Contracting Management Office.

a major milestone? Could the training come to us so we can ensure we have the right staff available? Could the training employ team-based critical thinking techniques that we can use after the training event? Could it even be fun?

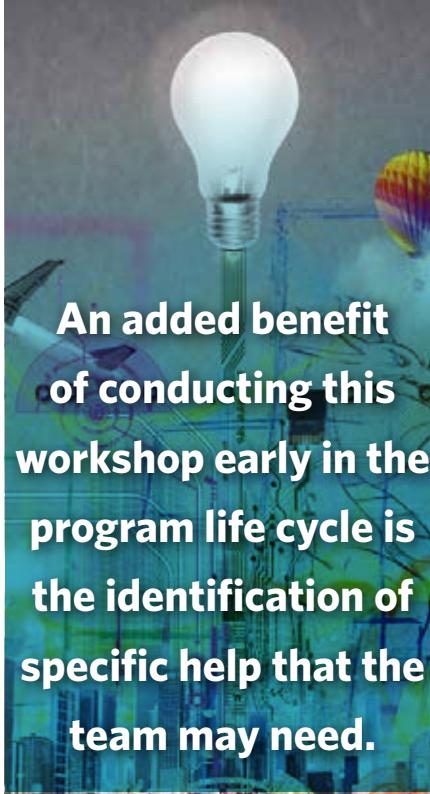
Believe it or not, the answer to all these questions is yes!

The Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) at Aberdeen Proving Ground, Edgewood Area, in Maryland, and the Defense Acquisition University (DAU) have partnered to develop a new, 1-week Mission Assistance workshop that does all these things and more.

The new workshop, Acquisition Strategy Development Workshop (WSM 014 in DAU's i-catalog), is designed to provide program teams with training that helps streamline their Acquisition Strategy in preparation for the Milestone Decision Authority review. The training challenges the teams to tailor their acquisition strategies with a focus on eliminating non-value-added effort and delivering high-value capability within programmatic constraints. It also attempts to enable more informed decision making early in the program life cycle. While the JPEO-CBD has primarily targeted Acquisition Category (ACAT) III programs for the workshop, it can easily be tailored to ACAT I and II programs. ACATs facilitate appropriate decision making and oversight of acquisition programs based on funding and interest levels. ACAT I programs are the most costly and have the greatest reporting and documentation requirements. The budgetary amounts designated decline for ACAT IIs and ACAT IIIs, as well as the reporting and documentation requirements.

The need for this new workshop was driven by a few key factors. At the JPEO-CBD, the most important factor was reducing cycle time. The JPEO has determined that ACAT III program managers can find efficiencies by identifying and acting on opportunities to reduce or eliminate burdens associated with larger ACAT I programs. The key is to obtain better value in balancing programmatic constraints with risk. For example, a small ACAT III program may be planning for significant use of commercial off-the shelf (COTS) and nondevelopmental items. This planning assumption suggests that several documents and tasks focused on technology risk would not be needed or could be tailored to reflect the nature of the developmental risk.

A second driver for the workshop was the need for a comprehensive training effort that pulls together the multiple functional areas of an integrated product team (IPT). One of the workshop's tenets is that key functional team leaders are



to participate in the full event. That full participation is needed because several team exercises during the event require an IPT perspective. For example, technical, financial and supportability risks are identified as parts of overall risk identification. The team members then discuss how they plan to mitigate the risks.

Because an Acquisition Strategy involves technical, business and supportability elements, the workshop content to support this task needed to be broad but relevant. The workshop agenda typically includes more than 14 different topics that cut across functional areas. Understanding the policy and proven practices is a good starting point, but the challenge is to determine how best to apply the tools to each program. As part of each module in the agenda, a discussion is facilitated of how the team will address each area in its strategy.

Integration is required on other past topics and content, since some of the content builds on earlier assessments. To facilitate this task, the team members are provided a briefing template to fill out as they progress through the workshop. The event culminates with a debriefing to examine the team's ideas and assessments while a final strategy is developed.

Finally, a third driver is the need to help teams avoid common inception issues through critical thinking techniques introduced at the beginning of the training and used throughout the week to reinforce the value of good thinking in designing a path forward. Root cause analyses of programs incurring significant cost and schedule growth often point to program inception issues when program development is just starting.

A good example is a framing assumption—a fundamental belief about program conditions that we expect to remain true in the future. If such an assumption proves to be wrong, then the program's cost, schedule and performance expectations could also be invalid and create significant problems in meeting expectations. For example, if the team believes that significant use of COTS equipment will help satisfy the requirement, this belief then drives cost, schedule and performance expectations. If it turns out that very little COTS can be used, then cost estimates and schedule durations will be significantly different.

As part of the workshop, the team develops program framing assumptions. The assumptions then are examined carefully to ensure they meet the criteria for good assumptions. Finally, the team members discuss their plan to periodically review the assumptions and make any needed adjustments. Techniques to avoid other inception problems—such as poor risk management,

lack of robust systems engineering, and inadequate planning for supportability—are also addressed during the workshop.

DAU and JPEO-CBD recently conducted the first offerings of the workshop at Aberdeen Proving Ground. In addition to the program teams, JPEO-CBD headquarters staff, the Army Program Executive Office (PEO) for Command, Control and Communications-Tactical staff, and the PEO staff for Intelligence, Electronic Warfare and Sensors attended in order to observe and evaluate the workshop. Based on feedback from participants and observers, the workshops were very successful and helped the team to develop an excellent strategy and planning foundation. The workshops culminated with debriefings about the team's developed content, including several streamlining proposals and ideas to improve program execution efficiency. Valuable feedback from participants enabled the DAU workshop team to make some initial modifications to the overall flow and content.

An added benefit of conducting this workshop early in the program life cycle is the identification of specific help that the team may need. Since the workshop covers a very broad range of topics, spending more than a few hours on each usually is impractical. The team members may realize that they possess little experience or skills in a particular area. During discussions and next steps, additional resources (including training events) can be identified to help fill those gaps as the team moves forward, both pre- and post-award.

Indeed, DAU and JPEO-CBD have developed a series of tailored workshops that are designed to train acquisition workforce to comply with and excel within the latest regulatory and policy guidance. These workshops are available to any Army PEO within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology and to other acquisition organizations. The workshops include:

- Contracting for Program Managers which provides an overview of the revised Department of Defense (DoD) Instruction 5000.02 and contracting strategy, contract funding, contracting incentives, contract types, updates to the Federal Acquisition Regulation (FAR), DoD contracting initiatives and their impact on programs.
- Other Transaction Authority (OTA) (Basic and Advanced), designed to orient program teams on OTAs and to indicate when they are appropriate.
- A Contract Incentives Workshop that teaches development and implementation of contract incentives.
- A Source Selection Workshop that provides prospective Source Selection Evaluation Board members with an overview of the source selection process for competitively negotiated procurements under FAR Part 15.
- An Acquisition Program Transition Workshop held shortly after a contract is awarded. This workshop is conducted with the government program team and the winning offeror and seeks to align the efforts of both parties in managing risk and deliverables.

- Other possible training includes risk management workshops and various types of systems engineering training. During the workshop, the DAU instructor also will identify appropriate DAU online tools and products to supplement the participants' resident training.

While this acquisition training now is part of the JPEO-CBD rhythm for new ACAT III programs, other organizations could benefit. To that end, other Army PEO programs have been invited to start participating in these workshops. DAU is working with the JPEO-CBD, the Army and other DoD acquisition stakeholders to assess the demand for future workshops and build faculty strength to meet future demand. While programs have already been scheduled for the balance of Fiscal Year (FY) 2017, we expect that FY 2018 will offer opportunities for expanding the workshop to many more programs across the Army and other DoD acquisition organizations. Depending upon demand, a lengthy lead time might be needed to schedule this new workshop as added DAU faculty members ramp up. This constraint suggests early engagement and discussion of availability with the appropriate DAU Regional representatives.

How is this training fun? The fun part is actually working in small teams and applying critical thinking skills to solving real program problems. Indeed, the workshop may provide the first occasion for working as a team in an environment where team members can singularly focus on developing their acquisition strategies without distractions. The facilitators have observed that the teams enjoy rising to the challenge and thinking about their issues with new tools and methods. It can be exciting for them to develop new approaches and ideas that they hadn't thought of or used before. Studies show that the energy level and enthusiasm of small teams can be significant, given the right conditions, including well-established team norms of behavior, respect for everyone's input, emotional intelligence, and other traits often associated with soft skills.

The workshop's critical thinking module on the first day sets a baseline for this type of team interaction and is reinforced throughout the week. To increase this emphasis, a module on high-performing teams has been added to the agenda on the last day. It culminates with a team survival exercise that challenges participants to excel in group problem solving and collaboration.

In closing, we believe that this new workshop offers great potential to assist teams in planning their new acquisition strategies. While the initial feedback has been positive, we need to follow up with the teams several months later to evaluate the training's effect on program outcomes, products, and/or processes. This longer-term evaluation will enable us to make subsequent workshop improvements and assist us in determining what tools and practices best help program or project managers and their teams to succeed. &

The authors can be contacted at brian.schultz@dau.mil and jeffrey.w.megargel.ctr@mail.mil.

How to Improve DoD-Industry Collaboration

Mandate It and Make It a Mindset

Lt. Col. Douglas B. Ogden, USMC

For the past several years, the government has directed that innovation be made a key ingredient of acquisition. Industry has embraced this idea, and it has become a standard practice. Many Department of Defense (DoD) suppliers have stood up innovation cells within their organization, whereas others have claimed that their entire organization is the innovation cell.

So what other practices can we embrace in order to improve acquisition? What should we be doing more of in order to develop and deliver quality products, on time, at an affordable price? One thing we can do is ensure we maximize collaboration between all stakeholders when developing new requirements, designing new products, or resolving issues on existing programs.

Ogden is a U.S. Marine Corps Acquisition Professional with 13 years of acquisition experience, most of which has been in program management. He has served as the platform Integrated Product Team Lead for H-53E helicopters, VH-3D and VH-60N Presidential helicopters, and MV-22B tiltrotors. He wrote this article while serving on a Secretary of Defense Corporate Fellowship in 2016.

Requirements Generation

It is widely accepted that successful programs start with solid, stable, achievable requirements. So we should involve every organization that can provide a benefit generating those requirements. This would include not only all of the government agencies to be affected by the requirements but also our industry partners. There are many past examples where we have developed requirements without talking to industry, only to find out after a contract was awarded that we were "shooting for the moon" and challenging industry too hard. The next thing you knew, we were painfully negotiating with the contractor to change the contract, adding time to the schedule and increasing the program cost. All of this waste of time and effort could have been avoided if we had collaborated up front and jointly developed reasonable and achievable requirements.

Distributing draft requirements out to all stakeholders, including industry, should be the standard procedure. The Air Force is actively doing this as part of their "Bend the Cost Curve" initiative. The primary goal is to link government and industry together early and often in the acquisition process to set realistic expectations, develop achievable requirements, and ensure that we receive our products in a timely manner and at an affordable price. An example of this initiative in work is the Air Force T-X competition. As the Air Force developed requirements for an aircraft to replace the aging T-38 trainer, draft versions were distributed to industry to allow for open and deliberate dialogue. The benefits of this approach are significant:

- Contractors can inform the government of their

true capabilities, and their limitations, information that can help the government develop achievable requirements.

Often the government isn't fully aware of all the developments within industry. If two-way dialogue is initiated between government and industry while the requirements are still being drafted, we can develop reasonable requirements that have a better chance of being achieved.

- Contractors can develop better proposals. If industry fully understands what the government wants, it can focus and maximize its innovations to develop higher-quality, timely and affordable solutions with a greater chance of success.
- Contractors are much more apt to enter into fixed price contracts if they are involved in the requirements development up front. They will be more comfortable with their plan, and be more willing to accept more of the risk.

Designing New Products

When designing new products, the goal should always be the achievement of acceptable quality the first time around. In an ideal world, every product designed would require no rework or redesign when the prototype is fabricated. While that may be hard to achieve, it should be the goal. The closer we can get to that ideal condition, the more time and money we save, ultimately getting the product to the customer as quickly as possible and at the best price possible. So how do we do that? By involving all required stakeholders in the design and development process. Today's weapons systems are more complex than ever and, given current budget constraints, program execution has become increasingly difficult. Having

a strong industry/government team is more imperative than ever. Making the investment up front to

assemble the government requirement owners, government program office personnel, and industry to work together on the design of the product will ensure the best chance of achieving first-time quality.

Issue Resolution

Most would agree that the best-laid plans never survive first contact with reality. Issues will arise on every program we develop, some of them causing significant schedule slips and cost growth when they are not dealt with promptly and intelligently. Fortunately for us, our government and industry teams include a diverse group of people, with each person bringing different experiences, knowledge and capabilities to the table. When only one person works on solving a problem, the solutions are limited to that person's knowledge and experience. When several people work an issue, the chances of arriving at a better solution increase. Putting more heads together on a problem increases the odds of resolving issues faster, better and with potential cost savings or cost avoidance.

Barriers to Collaboration

So if we know collaboration is a good thing, why don't we do more of it? Because there are barriers to collaboration that we must address and resolve. Some examples:

Egos: In a profession filled with "Type A" personalities, there are glory hounds who want to take all of the credit for success and not involve others in solving problems. Acquisition professionals must check their egos at the door and remember that acquisition is a team sport.

Fear of working in a group: In contrast to the Type A's, there are introverts in the business who prefer to work alone or are embarrassed to be in groups for fear that they may show a lack of knowledge or say something wrong in a meeting. These folks must embrace their fear and conquer it. They are not helping the collective effort by working in a silo.

Conflicting personalities: Not everybody gets along, and most of us have at one time or another felt we knew whom we could talk to in order to resolve an issue, but cringed at the thought of calling them because we just didn't get along with them. Breaking through this reluctance takes some moral courage.

If two-way dialogue is initiated between government and industry while the requirements are still being drafted, we can develop reasonable requirements that have a better chance of being achieved.

We all must realize that we are not going to get along with everybody, nor are we going to please everybody. Consider it a challenge to develop better interpersonal skills. Keep it professional and focus the project on the warfighter you are ultimately supporting; remind your comrade of the common goal. If a working relationship cannot be forged, then it needs to be taken to a higher level for resolution. Nonfunctional relationships only hamper the effort and ultimately the end user.

Lack of trust: This usually builds over time when people do not get along. The only way to regain or build trust from the ground up is to work together as a team and earn it. Again, moral courage is required.

Lack of transparency: Some people resist sharing information that may highlight issues, focus unwanted attention on failures, and highlight who is responsible. Fear of retribution is certainly natural, but bad news does not get better with time. So the sooner we can solve problems and eliminate them, the better chance we have of keeping the project on track.

Limited travel budget: Current budget constraints mean that fewer people are allowed to travel. This is unfortunate, because most people prefer face-to-face collaboration for several reasons. Body language can be read, and no one can hit the "mute" button to have a private sidebar without the rest of the team hearing. Because of this, transparency is better achieved in face-to-face meetings. Also, you don't have the problem of more than one person trying to talk at the same time, which often occurs during telecoms or Web-based program events and can lead to frustration. Finally, in-person meetings help form relationships and team cohesion. However, our reduced budget has increased the need for use of electronic collaborative tools in order to connect team members around the globe.

Difficulty with electronic collaboration tools: Some people are hesitant to use collaboration tools such as video teleconference (VTC) or Web-based meeting programs because of the effort required to coordinate an electronic meeting, the difficulty in using the available tools, the poor quality of the tools (delayed video and audio, etc.), or because not every team member has access to the tool. This merits further discussion.

Electronic Collaboration Tools

There are many collaboration tools out there, ranging from low fidelity and inexpensive, to high fidelity and very expensive. Each has different capabilities and its own advantages and disadvantages. The electronic tools chosen for your program should be tailored to the size and complexity of your project—and, obviously, your budget. In several interviews with both government and industry employees, some common themes emerged:

- Collaboration improves relationships and increases productivity.

- Good collaboration can help prioritize requirements and prevent faulty assumptions.
- Face-to-face is best, but it's hard to get all the players in one place.
- Collaboration tools in some form typically are available in their workspace, whether at a computer or in a conference room, or both.
- Not all collaboration tools function well. Sources of frustrations include that the tools are difficult or cumbersome to set up; they are not intuitive; their video, audio, or display of documents and briefs are poor; and not all players have access to the collaboration tool.

Understanding and dealing with these complaints is critical, because your team's constant frustration with the tools provided will inhibit collaboration and not provide the benefit sought. Therefore, in choosing your team's electronic tools, consider quality, ease of use, ease of setting up, accessibility to all team members and stakeholders, and affordability.

Recommendations

The center of the universe for acquisition programs is the program manager (PM), who is accountable for the program's success or failure. Therefore, it is the PM's responsibility to lead the team, ensure balanced collaboration, and continually drive the team to accomplish the mission in the most timely and affordable manner.

PMs cannot run programs all by themselves. They rely on their team of professionals and all of the stakeholders to contribute to their programs' success. Therefore, they must be the driving force to ensure that everyone works together effectively and efficiently. Not everyone is wired to naturally want to work with others, so many team members must be guided by their leaders and managers. Government PMs must focus on setting up and maintaining good government-to-government relationships, and government-to-industry relationships. Industry PMs must focus on setting up and maintaining good industry-to-government relationships, and industry-to-industry relationships (including those with both prime contractors and subcontractors). This is easier said than done because not all government agencies agree with each other, and industry primes often see their subcontractors or industry partners as "competitives." The only way to break through these differences and build trust and relationships across the board is strong leadership in both government and industry.

So how do we guide our teams to work together and break through the barriers? First of all, we need to make working together a mindset. As an example, in my previous roles as an Integrated Product Team Lead on acquisition programs, I developed an almost Pavlovian response to issues when they arose. Almost every day, someone from my team in the program office, or a stakeholder from the fleet or the Pentagon or industry,

Collaboration is more than just getting together; it is working together. Having regularly scheduled meetings or telecoms must be more than just a status call.

Meetings need to be productive.

would present an issue.

Over time, my automatic response to this became, "Let's determine the Root Cause, then develop and implement corrective actions." Collaboration needs to become an automatic response in much the same way. Whenever a team leader or manager is presented with an issue, or a capability gap, the automatic response should be "Who are we getting together to solve this, and how are we going to get them together." Make it a mindset.

The second part of the answer is to mandate collaboration. Every team typically has a charter that establishes roles and responsibilities, so why not include in that charter a collaboration plan? It need not be elaborate, but should simply state how and when the stakeholders will get together—weekly, monthly, quarterly, in person, by telecom, by Web-based program, by VTC, etc. If you want your team to work together, you have to organize it and make it happen.

The third part of the answer is to provide the necessary tools to allow the collaboration. This includes providing funding for people who must travel when face-to-face meetings are required, and also providing the appropriate level of effective electronic tools so the team can collaborate with stakeholders around the world at the click of a button. Significant savings can be realized by having a Web-based meeting or VTC, as opposed to flying in people from faraway places.

Selection of the appropriate electronic tools will depend on the size and range of the team, the complexity of the product being developed, and, obviously, the budgetary limitations. The tools must be easy to set up, accessible to all stakeholders, of good quality—and their use must be intuitive. If the tools are difficult to set up, no one will take the time. If not all stakeholders can access the tools, the team will not be completely involved. If the tools are of poor quality or difficult to use and understand, no one will want to use them.

Another recommendation is to make each of your conference rooms Collaboration Centers. A conference room is simply a room with tables, chairs and a drawing board. A Collaboration Center has collaboration capability such as a computer interface that provides a Web-based program or VTC, large monitors that can display documents, briefs and drawings,

and cameras that allow all players to see each other. Once you select or design a Collaboration Center that is appropriate for your program size and complexity, strive to have all of your Collaboration Centers in your program office of the same configuration. Having the same procedures and capabilities in each room will reduce frustration on your team and simplify the support of information technology.

The final PM challenge is to ensure balanced collaboration. Bringing people together needs to be for meaningful work that will contribute to moving the ball down the field. Collaboration is more than just getting together; it is working together. Having regularly scheduled meetings or telecons must be more than just a status call. Meetings need to be productive. This is where leadership comes back into play again. A team leader needs to ensure that the team is truly working together and progressing toward a common goal.

You also must be careful not to over-collaborate. Not everyone needs to collaborate with everyone. Over-collaborating can burn people out, and can be a source of team consternation. So, in addition to holding only meetings that have a purpose,

make sure only the required personnel attend the appropriate meetings. Likewise, encourage your team members to excuse themselves so they can continue with their work if they feel they do not need to attend a particular meeting.

A final recommendation is to provide a Web-based collaboration forum to your team members to allow them to communicate and solve problems together. Many issues have been solved before, and reinventing the wheel repeatedly is just wasteful. A Web-based forum would allow your team to post issues that others may have already resolved, pass on success stories that others can learn from, and build team cohesion.

There are many ingredients in building a highly functioning team that runs like a well-oiled machine, but it all comes down to leadership. Good leaders listen to their teams, gain an understanding of what their teams need to execute, and then provide their teams with the appropriate tools to accomplish their mission and consistently produce great results. &

The author can be contacted at douglas.ogden@navy.mil.



DAU is continually looking for new topics, tools and resources to help you succeed on the job.

HOW DO WE KNOW WHAT YOU NEED? **YOU TELL US!**

VISIT

<https://www.dau.mil/tools/t/Request-a-New-Tool>

Take a quick two-question survey on the topics, tools, and resources you need.



The Ethical Imperative and Courage to Cancel

Eugene A. Razzetti

Looking back on an association of more than 40 years with the military (27 years spent on active duty) and a more than 50-year career in management, including time at the Pentagon; and then (most recently) reading the farewell writings of Under Secretary of Defense for Acquisition, Technology, and Logistics Frank Kendall, I am forced unenthusiastically to several conclusions:

Razzetti, a retired U.S. Navy captain, is a management consultant and military analyst. He authored five management books, including *The Executive's Guide to Corporate Responsibility Management* and *MVO 8000* and has served on the advisory boards of two business schools.

The Ethical Imperative: Lives are at stake—either make the program work or make it go away!



My decision briefing to my bosses at CNA ended with a slide bullet that read: "We have an Ethical Imperative to withdraw our support from the program." I had never thought to use that term before.

- Some Department of Defense (DoD) acquisition problems come from Congress and can thwart the best efforts of the most conscientious program managers.
- The same practices and procedures that characterize the successful management of acquisition programs can (and should) lead unapologetically to a decision to cancel those same programs.
- Technical and programmatic problems, sooner or later, have legal and ethical implications.

In 1982, as a young commander in the Pentagon and earlier having squandered my Navy career at sea, I tried to kill an overly bloated program for a mine countermeasures system. The program was devoid of meaningful milestones, the contract devoid of meaningful sanctions, and the vision devoid of meaningful reality. The delivered product would not have performed as required and sailors relying on it would have been endangered. The only indicators trending upward for the bloated program were its cost and the completion date. The Chief of Naval Operations wanted to kill it. Funds were tight, and we had many smaller, more cost-effective, "bread and butter" programs that could have used those funds. We wanted to put the funds to better use, for predictable and measurable benefits.

The prime contractor, who had established a plant in the home state of a member of the Senate Armed Services Committee, complained to the senator. Predictably, the senator directed that we put the funding back. Funding for the sensible but unglamorous programs was not his concern.

In 2006, as a military analyst for the Center for Naval Analyses (CNA), I worked on a program intended to develop sensors for detecting chemical and biological agents and to deploy those sensors in strategic ports of embarkation/debarkation (in the Middle East). The program was literally a "401k" for contractors, systems commands and "scientists" of all types. But it potentially endangered the lives of soldiers, sailors and Marines. Field testing results were deceptive, and contractors tried lowering the bar to skew test results in their favor.

My decision briefing to my bosses at CNA ended with a slide bullet that read: "We have an Ethical Imperative to withdraw our support from the program." I had never thought to use

that term before. Management agreed, and we helped to drive a stake into the heart of a shameless, wasteful and potentially dangerous program—in the meantime saving our own reputations.

The Ethical Imperative and the Best Guidance You Could Ever Want

When Adm. James D. Watkins was tapped to return to Washington as Chief of Naval Operations, he brought back with him (then) Vice Adm. Lee Baggett, Jr., to become Director of Naval Warfare. Watkins' guidance to Baggett to improve performance of programs in the contentious and often antagonistic branch was: "Either make it work or make it go away." Unsurprisingly, Baggett made it work. Watkins' guidance had a profound influence not only on an important branch of the Navy, but also on an unimportant young commander in the Pentagon's trenches. "Make it work or make it go away." What wiser guidance could ever be given, and what more welcomed guidance could ever be received?

Ethics in Program Management

For our purposes, consider "ethics" as a systematic reflection on rules and issues—the way people act and the rules that form the basis of their actions. Most of us endeavor to do what we believe is right. To drive safely for the benefit of pedestrians is ethical; to drive safely because it is the law is to fear a penalty and/or punishment. Ethics come from within a person's moral sense and desire to preserve his or her self-respect. Legal requirements come from outside the individual. Organizational ethics (which I call Corporate Responsibility Management) institutionalize reflection on those rules and issues, and then create and control all of its processes to ensure that the organization in question performs to established ethical standards.

To operate "legally" is to operate in conformance with all established laws and regulations applicable to the mission of the organization. Laws and regulations are created by governments to protect their citizens.

Table 1 describes the workaday preoccupations of program managers and staffs. Since (theoretically at least) our laws reflect our ethical beliefs, you can adhere to both and violate both simultaneously. An ethics-centered organization has an

Table 1. Legal and Ethical Problem Areas in Program Management

Problem Area	Legal	Ethical
Vision and Mission Development	✓	✓
Strategic Planning	✓	✓
Financial Management	✓	✓
Contract Management	✓	✓
Technology	✓	✓
Configuration Management	✓	✓
Research and Development	✓	✓
Risk Management	✓	✓
Supply Chain Management	✓	✓
Data Analyses	✓	✓
Training and Qualification	✓	✓
Vendor Management	✓	✓

Tables and figures by the author

organizational “character” and strategy, taking very seriously not only its mission but also its responsibility to employees, customers and the community.

Ethical violations may not result in punishment; legal violations carry punishment to the violators. When program managers uncover legal problems, they create, de facto, an ethical imperative to take corrective action. Accordingly, it is virtually impossible to have only a legal problem or only an ethical problem.

Critical Thinking and Sound Judgment

In his final article in the January-February 2017 issue of *Defense AT&L*, Kendall also wrote about the need for critical thinking and sound professional judgment. To that, we now add Ethical Imperative and create what you could call the three musketeers of program management. Like the slogan of Alexandre Dumas’ courageous “Three Musketeers” of old: “One for all and all for one.”

Critical thinking, according to Wikipedia, demands the ability to:

- Recognize problems, and find workable means for meeting those problems.
- Understand the importance of prioritization and order of precedence in problem solving.
- Gather and marshal pertinent (relevant) information.
- Recognize unstated assumptions and values.
- Comprehend and use language with accuracy, clarity and discernment.

- Interpret data, to appraise evidence and evaluate arguments.
- Recognize the existence (or nonexistence) of logical relationships between propositions.
- Draw warranted conclusions and generalizations.
- Test one’s conclusions and generalizations.
- Reconstruct one’s patterns of beliefs on the basis of wider experience.
- Render accurate judgments about specific things and qualities in everyday life.

In sum: “Critical thinking is a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports or refutes it and the further conclusions to which it tends.”

Sound professional judgment means our capacity to assess situations or circumstances wisely and to draw sound conclusions. This involves applying relevant training, knowledge and experience within the context provided by pertinent professional and technical standards, as applicable, in making informed decisions about appropriate courses of action.

Outside auditors (like me) are reminded continually of the requirement under international standards such as International Standards Organization 9000 to apply a structured skepticism throughout the audits. Auditing, in this sense, is institutionalized and structured critical thinking and refers to the appropriate application of professional skepticism.

Vision vs. Reality

Another part of Kendall’s article concerned vision vs. reality and how important it is for a product or system to address the threats and employ the capabilities of the real world.

Figure 1 describes the transition of visions and missions into actionable systems and equipment through a series of sound program management processes. It also serves to remind the reader that conformity with sound management processes, de facto, creates an optimal environment for sound ethical decision making.

Requirements analysis, for our purposes, means determining the needs or conditions to meet new or altered project requirements. Robust requirements analyses are essential to the success of a DoD acquisition program. The structure and outcome of the analyses must be documented, measurable and capable of being verified and validated. Most importantly, the analyses must create actionable intelligence related to program needs and opportunities. Analyses must be clear, complete, consistent and unambiguous. The findings of the (needs and) requirements analyses form the heart and soul of the contract, especially as reflected in the design, statement of work, and all the measurable goals and objectives. Milestones dates must be enforceable and enforced.

Due diligence can be defined as “investigation by or on behalf of an intended buyer, to check that the offeror has

The findings of the (needs and) requirements analyses form the heart and soul of the contract, especially as reflected in the design, statement of work, and all the measurable goals and objectives.

the desired assets, capabilities, technologies, brand rights, contracts, and other attributes required by the buyer and claimed as provided by the offeror.” Put another way, all the facts are available and have been verified. Areas for vendor due diligence audit and/or verification include (to mention the big ones):

- Environmental and occupational safety and health compliance
- Corporate security (including cyber and information systems security)
- Manufacturing quality and competence
- Adherence to federal and state laws and regulations
- Budget monitoring and controls
- Supplier and supply chain management
- Code of ethics and standards of conduct

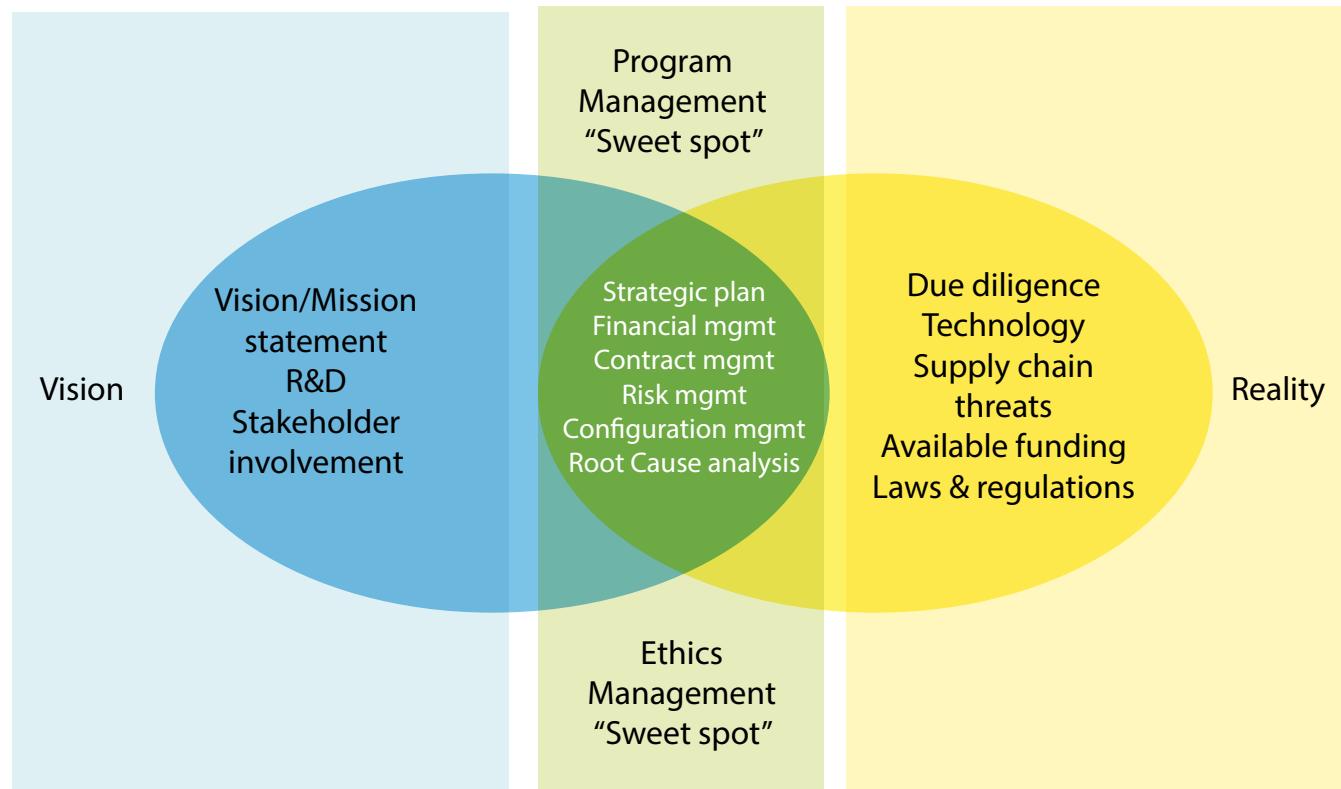
- The ability of investigate root causes of failures
- A robust set of internal controls
- Engineering and configuration management
- Capacity for growth or expansion.

A DoD decision to make a major purchase, acquisition or investment should reflect a comprehensive and structured due diligence process, custom-tailored for the specific undertaking. Regardless of the outcome, you will have given it your best shot.

Program Essentials

Table 2 lists fundamental acquisition program management requirements. Strength in all of them is essential; weakness in any of them should make a program fair game for critical review and possible cancellation. Moreover, the same DoD

Figure 1. Vision vs. Reality



people expected to manage programs successfully should be encouraged to make their voices heard when cancellation is indicated.

The last row is the “Ethical Imperative.” The program is satisfactory (SAT) if management recognizes and fosters it and unsatisfactory (UNSAT) if it does not exist.

Bullet-proof, Bullet-prone, Bullet-worthy

Programs, either at their inception or early in their implementation, predictably fall into one of three categories:

- Bullet-proof because there is an unimpeachable vision, based on unimpeachable needs and requirements assessments, and they contain realistic goals and actionable objectives and milestones.
- Bullet-prone because the vision is convincing, but does not reflect the needs and requirements assessments, and/or the metrics are lacking.
- Bullet-worthy because even the most basic criteria described above are not measurably being met.

Figure 2 illustrates the ongoing necessity to monitor programs and to act forthrightly when action is necessary. Where is your program right now, and why? The breakdown of the bars is for illustration only, as are the notional areas being measured. The points to remember are:

- The soldier, sailor, airman or Marine—not the member of Congress—is the primary stakeholder
- Constant vigilance is the order of the day.

Rounding Up the Usual Suspects

Troubled programs don’t get that way overnight. The signs are there, and they become more visible with each missed milestone. Program managers and staffs know how to identify problems but often have difficulty making them known to (or accepted by) higher authorities, especially if the only way out appears to be canceling the program.

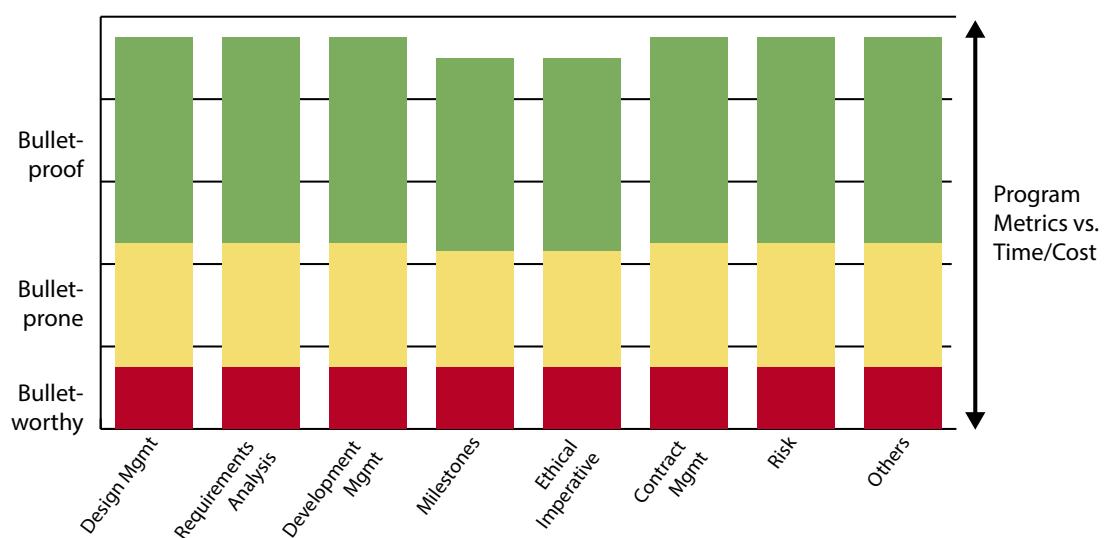
It is likely that many of the problems discussed thus far will be evident in a troubled program. It is just as likely that program managers can show in a documentable way when something started to go wrong and predict-

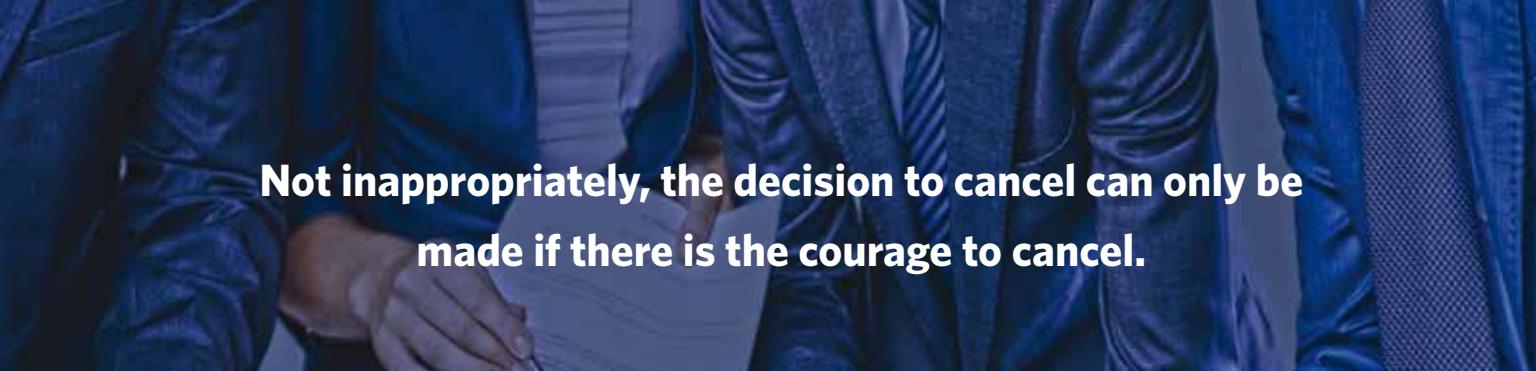
Table 2. DoD Program Essentials

Program Essentials	SAT: Manage It	UNSAT: Cancel It
Program commitment at the top	✓	✓
Milestones	✓	✓
Metrics	✓	✓
Due diligence engrained in program	✓	✓
Vision and Mission vs. Reality	✓	✓
Stakeholder influence	✓	✓
Separate/related program interference	✓	✓
Contractor competence/motivation	✓	✓
Congressional involvement	✓	✓
Risk Management strategy	✓	✓
Requirements analyses	✓	✓
Benchmarking/gap analyses	✓	✓
Configuration management	✓	✓
Supply chain	✓	✓
Contract structure (Cost Plus, Fixed Firm Price)	✓	✓
Contractor Code of Ethics and Standards of Conduct	✓	✓
ETHICAL IMPERATIVE—ALL PARTIES	✓	✓

ably determined the outcome. This does not mean that the program manager’s findings and recommendations, however quantifiable or actionable, will be accepted at the top of the totem pole.

Figure 2. A View of the Bullet Paradigm





Not inappropriately, the decision to cancel can only be made if there is the courage to cancel.

Table 3 includes (cynically) historical causes that could have delayed, extended, weakened or otherwise trashed DoD programs, as seen by the outside world. Look at the possible causes and see if you can find the right one—and good luck proving it.

The Courage to Cancel

Not inappropriately, the decision to cancel can only be made if there is the courage to cancel. The decision to cancel is the result of asking questions like these—and getting the wrong answer:

- Is the program on track (with sound metrics, milestones realistic/met)?
- Is the contractor qualified and motivated, or did it just book the business?
- Have all the legal and ethical obligations been met?
- Does the program “vision” reflect reality?
- Is there excessive influence from stakeholders and higher authorities?
- Does the threat of protest or lawsuit permeate program operations?
- Is the program risk excessive and/or unmitigated?

We have covered the justification for a decision to cancel. The courage to proceed after that has to come from the individual program managers and their chains of command. Take courage and good luck.

Summary

Put this sign over your desk:

***The only thing necessary for evil to triumph
is for good men to do nothing.***

—Edmund Burke

The effect it will have on your staff and your visiting contractors will be immediate and visible.

It was, is, and will always be great sport to kill a program that does not measure up to requirements, especially when it is being sustained for the wrong reasons.

Faithfully and diligently, program managers scrutinize their processes. In doing so, they predictably either reinforce or expose the underpinnings of their programs. When program

Table 3. Outsider View of What Went Wrong

Causes of Potential Program Failure	Can't Be	Must Be
Unethical/unscrupulous/unqualified contractor(s)	✓	
Congressional interference/direction	✓	
Systems Command bureaucracy and intransigence	✓	
Lack of milestone enforcement/discipline	✓	
Lack of top level support and due diligence	✓	
Vision, mission, operations capabilities unclear/specious	✓	
Threat of protest and/or lawsuit by contractor	✓	
Inappropriate/unenforceable contract structure; mission creep	✓	
Needs analyses inappropriate/incomplete/non-existent	✓	
Budget cut/withheld	✓	
Tailored source selection	✓	
Lack of sanctions/penalties	✓	
Fraud, waste and abuse—multilevel	✓	
INEFFECTIVE PROGRAM MANAGEMENT BY THE MILITARY		✓

managers uncover legal problems, they create, de facto, an ethical imperative to act. It is virtually impossible to have only a legal problem or only an ethical problem.

The same measuring rods that support a good program indict a bad one. The ethical imperative—that discomforting reminder to leaders and managers that when lives are at stake you either make the program work or make it go away—is both timeless and universal.

Simple? Of course! But why then is it applied so infrequently and ignored so frequently—at least at the top? **&**

The author can be reached at generazz@aol.com.



All Aboard! Earned Value Management in DoD

John McGregor ■ Karen Kostelnik ■ David Nelson

Seventh in a series of articles

The Office of Performance Assessments and Root Cause Analyses (PARCA) is responsible for Earned Value Management (EVM) policy, oversight and governance across the Department of Defense (DoD).

To be effective, EVM practices and competencies must be integrated into the program manager (PM) acquisition decision-making process; the data provided by the EVM System (EVMS) must be timely, accurate, reliable and auditable; and the EVMS must be implemented in a disciplined manner consistent with the 32 Guidelines in the Electronic Industries Alliance Standard-748 EVMS (EIA-748). PARCA's goal is to increase earned value's constructive attributes for DoD contractor firms managing acquisition programs by reducing the economic burden of inefficient EVM implementation.

One of PARCA's core tenets in accomplishing that mission is to work collaboratively with government and industry stakeholders to develop and publish EVM Policy. PARCA believes that policy and guidance should strike the appropriate balance between cost effectiveness and the need for programmatic situational awareness. There is a

McGregor is the Deputy Director for Earned Value Management in the Performance Assessments and Root Cause Analyses organization in the Office of the Assistant Secretary of Defense for Acquisition. His office serves as the Department of Defense (DoD) focal point for all policy, guidance, and competency relating to Earned Value Management. **Kostelnik** and **Nelson** support the office in developing policy and interfacing with DoD's government and industry stakeholders.

natural circle of EVM policy development as shown in Figure 1. This cycle reflects the fact that policies sometimes can result in unforeseen consequences that require updated language.

Drawing on the experiences of both industry and government experts is the most effective method of ensuring the government's requirements are affordable and achievable. PARCA works closely with military Service and Agency EVM Focal Points, the Defense Contract Management Agency (DCMA), as well as Industry partners led by the National Defense Industry Association (NDIA) Integrated Program Management Division (IPMD), to ensure that policy does not add hardship but facilitates the delivery of reliable integrated program management data for decision making.

The effective application of EVM policy across the DoD is a direct outcome of PARCA's collaborative stakeholders relationships. As examples of some recent PARCA collaborations, government and industry partners provided invaluable feedback during policy updates of the *Integrated Program Management Report (IPMR)* and associated *Guide*, and the *EVM System Interpretation Guide (EVMSIG)* that provides the DoD interpretation of the intent of the EIA-748 EVMS Guidelines. The enhancements of these two documents clarify the EVM system and EVM reporting requirements. Also, PARCA has worked over the years with the DoD Joint Space Cost Council (JSCC) in its efforts to understand the government and industry impacts and benefits of EVM and EVMS policies.

Policymakers should be willing to make changes, especially when acquisition methods change. One example is the increasing use of Agile Software methodologies in DoD acquisitions. Even though EVM principles and EVMS requirements can be rigid, there is some flexibility that must be documented clearly to allow for its understanding and dissemination. In the Agile example, PARCA has released an Agile and EVM guide for PMs when the two disciplines are used together. The guide was developed through a yearlong feedback loop with government and industry including EVM, Information Technology, and Business functional constituents. It documents the relationship between Agile and EVM and explains areas of flexibility regarding an EVM system's setup.

EVM provides a disciplined project management approach through an integrated planning and control system for authorized work in order to achieve cost, schedule and technical performance objectives. EVM's core outcomes are meant to provide the government insight into contractor performance, provide actionable information and help ensure confidence in the data received. There are several keys to ensuring that EVM provides value to government and industry and does not drive cost into the system. A discussion of these items follows.

Use EVM where appropriate. DoD Instruction 5000.02 and Defense Federal Acquisition Regulation Supplement (DFARS) Section 234.201 establish dollar and contract-type thresholds for cases when EVM should be utilized and incorporated into

Figure 1. Policy Development Circle



*DAU = The Defense Acquisition University

Source: DoD Office of Performance Assessments and Root Cause Analyses

a contract. In addition to these criteria, PMs should consider work scope and risk in deciding whether to use EVM in managing their programs. EVM is most beneficial when the scope of the work is discrete and measurable. Typical types of work for which EVM applies include development and integration efforts with specific end products or services that can be directly planned and measured. It may be appropriate not to apply the EVM requirement where the nature of the work does not lend itself to meaningful EVM information—such as maintenance and repair services that are provided as needed. If the EVM requirement is not placed on a contract due to the nature of the work, the PM should implement an alternative method of management control to provide advanced warning of potential performance problems.

Understand the baseline and whether it is achievable. In order to evaluate performance, a baseline for measuring it should be established. When using EVM (or when managing any program without EVM), it is imperative that the government and contractor understand the work scope and establish a plan to achieve technical, cost and schedule performance objectives. An Integrated Baseline Review (IBR) can be used as a means for government and contractor to discuss the work scope and the plan to accomplish the contract's statement of work. The IBR's outcome should be that the government PM understands whether the baseline is achievable in view of the risk profile. An IBR begins with planning the baseline and culminates in a joint review event. The IBR should be conducted as early as practical for the program within the required 180 days to ensure understanding and agreement of the performance measurement baseline. An IBR is not a one-time

occurrence and can be held at any time throughout the contract life cycle when the scope of work changes.

Manage and report at the appropriate level of detail. Contractors should establish a work breakdown structure (WBS) that best allows them to manage their work within the constraints of their systems. The level of detail in the EVM reporting, which is placed on contract through a Contract Data Requirements List referencing the IPMR, should be based on

and policies to a wider audience. Office representatives have spoken at various events such as the NDIA IPMD quarterly meetings, EVM World, the EVM Integrated Program Management Workshop (IPMW), EVM Practitioners Symposium, Acquisition Days at the Defense Acquisition University, and other events. PARCA has worked diligently to maintain two-way communication and to have an “open door” policy. In fact, PARCA has available an interpretation process for anyone to ask questions for clarification.

Too much detail in reporting will slow the review, response and strategic utility of the data and potentially detract from the agile nature needed for proactive government decision making.

scope, complexity and risk. Program Offices should only require EVM data deliverables to a level that maintains the cost effectiveness of the reporting, targets strategic areas, and aligns with how the program is managed. Too much detail in reporting will slow the review, response and strategic utility of the data and potentially detract from the agile nature needed for proactive government decision making.

Use the EVM data to make decisions. In order to act on information in the IPMR, the government must have confidence in the data provided. The EVMS data must be timely, accurate, reliable, auditable and implemented in a disciplined manner consistent with the 32 Guidelines prescribed in EIA-748. For programs involving more than \$100 million, where EVM is applied, DCMA reviews the system for compliance and, on an ongoing basis, identifies risks to ensure the reliability of the EVMS data. The results of DCMA’s activities are vital to the largest and riskiest DoD programs. Data from the EVMS should be used by government and industry stakeholders to facilitate joint situational awareness and in making their decisions. The data’s value is in what can be predicted and acted upon and its usefulness in leveraging trend analysis of past performance and identifying the root cause of variances from plan. EVM metrics by themselves are neither good nor bad but provide data points and information as a basis for communication and decision making.

In its mission to promote disciplined DoD EVM practices, PARCA regularly visits DoD installations, Government Service Acquisition Centers, industry facilities, and attends EVM community events to discuss changes to, and impacts of, policy. PARCA provides EVM policy training and initiative updates at industry events such as NDIA IPMD meetings and College of Performance Management workshops. The collaboration with the NDIA IPMD Board and event planners has been an invaluable resource to help promote new initiatives

Near-term DoD EVM policy updates are a result of the aforementioned feedback loop and response to interpretation questions on policy. The community can expect in the next year updates to the following:

- *Over Target Baseline/Over Target Schedule Guide (OTB/OTS Guide)*—the update will provide clarity on why an OTB/OTS is needed, what to do if it is needed, and the process to follow.
- *DoD EVM System Interpretation Guide (EVMSIG)*—updates are to be based on implementation of guidance over the last year and a half.
- *Agile and Earned Value Management: A Program Manager’s Desk Guide*—updates are to discuss effect of Agile on IBRs and how Agile metrics should work with EVM metrics.
- *IPMR Implementation Guide*—potential updates will move away from formats and toward data-centric delivery of information.
- *EVM Implementation Guide (EVMIG)*—a revival of a one-stop document for all EVM application and guidance information.
- *DFARS*—updates to reflect the \$100 million EVMS threshold class deviation memo and in concert with updates in the January 2017 DoDI 5000.02.

These policy initiatives, along with the outreach efforts to government and industry, enable PARCA to ensure the balance between oversight and system impacts. PARCA believes EVM should be a self-evidently beneficial methodology that provides PMs accurate and timely insight into cost, schedule and technical performance of DoD programs. Through the changes coming to leadership and organization within DoD, PARCA will continue providing succinct guidance on the interpretation and implementation of EVM.

The authors can be contacted, or information sought about the DoD’s EVM policy through the PARCA EVM Division, at osd.dodevm@mail.mil.

&

Integration Engineering and Critical Infrastructure Resilience

Don O'Neill

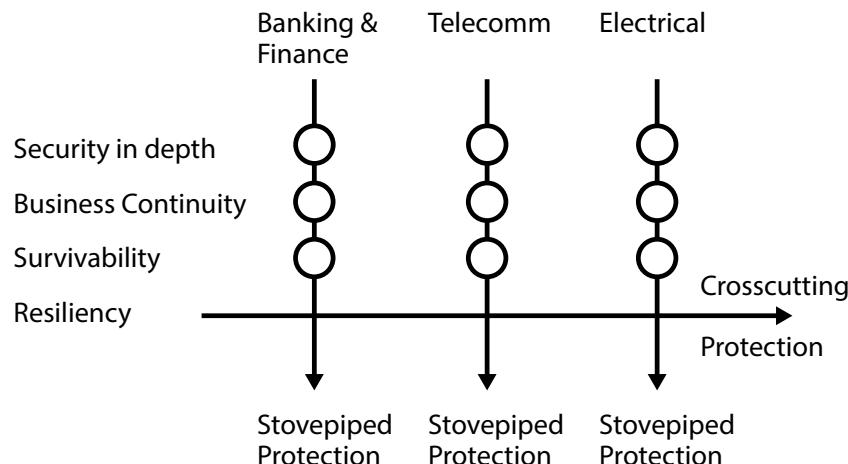


Let's take a look at the elements of the Critical Infrastructure Resilience Integration Engineering process, management, and engineering considerations—with attention to the roles of the resilience integrator and the intelligent middlemen and the convincing evidence provided by Earned Value Analytics used in calculating resilience risk.

The critical infrastructure is the industrial base on which the competitiveness and security of the nation depend. The current state of critical infrastructure is at risk now that the Internet has become the nation's central nervous system, in both the private and the public sphere. That critical infrastructure vulnerability to natural disasters and cascading cybersecurity attacks continues. In fact, software has become the critical infrastructure within the critical infrastructure. It is here—in the mashup among an immature software profession, a vulnerable cybersecurity environment, and diverse and interdependent industry sectors—that the challenge of system-of-systems resilience is born.

O'Neill was president of the Center for National Software Studies from 2005 to 2008. After 27 years with IBM's Federal Systems Division, he completed a 3-year residency at Carnegie Mellon University's Software Engineering Institute (SEI) under IBM's Technical Academic Career Program and has served as an SEI Visiting Scientist and a Litigative Consultant with the Department of Justice. A seasoned software engineering manager, technologist and independent consultant, he has a Bachelor of Science degree in Mathematics from Dickinson College in Carlisle, Pennsylvania.

Figure 1. Vertical Protection and Horizontal Resilience



Source of figures and table: The author

A more useful approach to critical infrastructure resiliency is needed, one that represents new thinking and perhaps a new paradigm based on adaptive measures rather than simply error discovery, more selective Internet usage based on proven user protections, credible deterrence through demonstrable strength, and convincing evidence provided by Earned Value Analytics.

Contrary to some assumptions, resilience is not primarily threatened by errors. Rather, it primarily is threatened by multiple contexts and opposing goals. Successful approaches to resilience are tied to harmonizing components and their adaptive capability. Nor should the goal of resilience simply be to bounce back to the earlier state before the moment of adversity or attack. It was, in fact, the earlier state that proved vulnerable. Herein lies the challenge.

Cybersecurity is not simply a problem awaiting a technology solution. Instead cybersecurity is a problem of user behavior awaiting a deeper awareness and an acceptance of responsibility. Simply put, individuals and organizations that cannot afford to lose data or information should not put it on the Internet. Those that can afford to lose data or information but would rather not to do so should exercise user protection by employing three-factor authentication and encryption.

On the big stage, Critical Infrastructure resilience is part of the February 2017 Defense Science Board's Cyber Deterrence Strategy and its deterrence by denial and by cost imposition. A resilient-ready Critical Infrastructure would achieve adversary deterrence by cost imposition and perhaps even deterrence by denial of particular objectives so long as there is a convincing credible will and demonstrable capability. Like Game Theory, a strategy of deterrence is based on rationality. Rationality in the context of cybersecurity cannot be assured when unprepared managers, politicians and lawyers are engaged in the deeply technical

issues of cybersecurity where there is no unified theory.

Based on nearly 50 indicators of resilience, Resilience Earned Value Analytics employ the most convincing evidence available to measure the degree to which the resilience value proposition is being achieved both collectively and in each industry sector and the degree to which unattended resilience risk persists.

Resilience and Protection

One respected researcher seemed to concede the high ground of resiliency—that is, avoidance—and associated resilience with the old Timex slogan, "Takes a licking and keep on ticking." The question then becomes: What perimeter is being secured?

In protecting a network node or a physical facility in a geographic region, each node or facility has to be protected and made survivable (Figure 1). In achieving resilience, propagation and cascading effects across the network and region must also be curtailed. This is made difficult by the context and culture challenges of the industry sectors within the critical infrastructure. The capabilities needed to impact crosscutting issues cannot be expected to evolve in a loosely coupled environment. They must be holistically specified, architected, designed, implemented and tested if they are to operate with resilience under stress. A management, process and engineering maturity framework is necessary to advance the assurance of software security, business continuity, system survivability and system-of-systems resiliency capabilities.

Resiliency Defined

Resiliency is the ability to anticipate, avoid, withstand, minimize and recover from the effects of adversity, whether natural or man-made, under all circumstances of use. Resiliency applied to a system of systems focuses on crosscutting issues. Crosscutting effects stem from dependent relationships. Some dependent relationships are planned and intended interactions between industry sectors, such as financial transactions embedded in telecommunications, electrical, transportation, and medical operations. Other dependent relationships are indirect and stem from outsourced commoditized services that bring with it opportunities for common single point failures among industry sectors, such as the Internet, the Global Positioning System, Federal Express, IBM, and Microsoft.

In order to operationalize resiliency, objectives must be matched with well-coordinated features. The objective of being able to anticipate calls for the features of harmonized domain engineering, coordinated recovery time objectives, cascade trigger identification, and digital situation awareness. The objective of avoiding the negative effects calls for the features of shutdown, defense in depth, operation

sensing and monitoring, and distributed supervisory control. The objective of being able to withstand the negative effects calls for the features of enterprise security, business process continuity, survivability and alternate site. And minimizing the negative effects calls for the features of adaptation management, alternate mode, minimum essential mission and shutdown. The ability to recover calls for the features of capability to reorganize, assured availability, information and data recovery, and cleanup and reconstitution.

Context and Culture Challenges

The critical infrastructure includes the numerous industry sectors that do the heavy lifting. There are diverse and complex operations within the industry sectors of the critical infrastructure. These industry sectors comprise an accidental system of

property, privacy, and antitrust litigation. Strong government control facilitates compliance for the benefit of the common good at the expense of initiatives taken in the service of self-interest. Industry sector public expectation and confidence vary with respect to trust, loyalty and satisfaction. The financial and medical sectors depend on public trust. The electrical and telecommunication sectors depend on customer loyalty and satisfaction. The diverse industry sector expectations of trust, loyalty and satisfaction must be respected, blended and harmonized.

Well-defined context and culture harmonization steps are needed to achieve Critical Infrastructure Resilience. Formality within an architectural framework facilitates the imposition of distributed supervisory control, interoperability,



In operation, these sector systems may inadvertently impose their own context and culture on others and clash with uncertain and unintended operational results.

systems that intersect operationally without a plan and design in advance.

Each sector system was constructed within its own context and culture. In operation, these sector systems may inadvertently impose their own context and culture on others and clash with uncertain and unintended operational results. Industry sector practice varies widely in their domain engineering approaches resulting in diversity in architecture, models and patterns that include their representation. Formality within an architectural framework facilitates the imposition of distributed supervisory control, interoperability, and operation sensing and monitoring protocols.

Industry management and engineering maturity varies widely. This results in diverse configuration management, frequency of release, conformity to requirements, and traceability among life-cycle artifacts. Strong code management practices facilitate reconfiguration and reconstitution. Industry sector practice varies widely in fielding and operating practices resulting in diversity in accountability and control, supply chain management, civility and pushback, and willingness to expend "off the clock" effort. Exercising strong control over the workforce facilitates business continuity and survivability.

Government regulation imposes varying industry sector impacts regarding export control, tax policy, intellectual

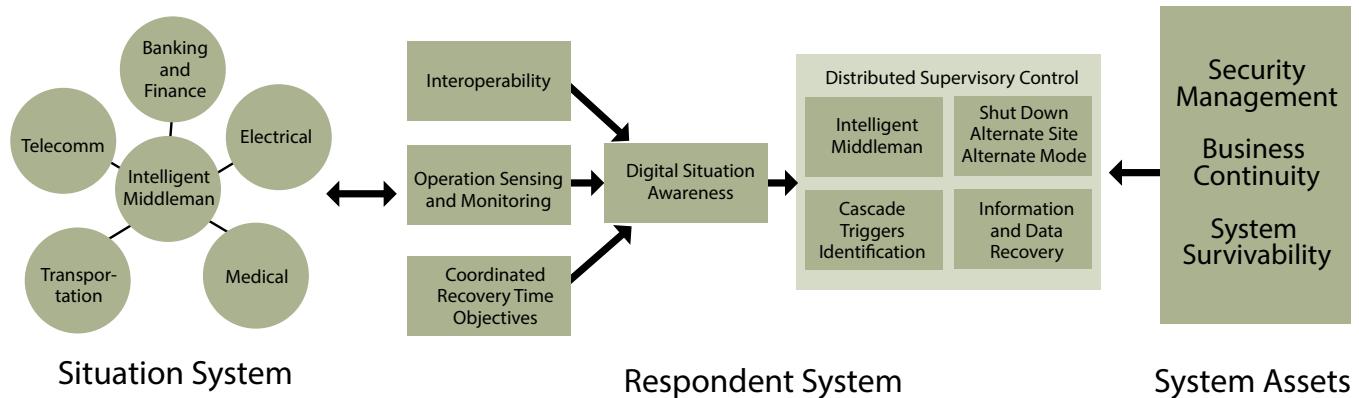
and operation sensing and monitoring protocols. Cascading and propagating triggers must be anticipated, avoided, and minimized including insource, open source, and outsource. Industry sector software sourcing exposures must be understood and managed—including insource, open source and outsource. Supply Chain Risk Management operations must be assured as must cybersecurity strategy policy decisions and defined tactics.

Resilience Integrator

A resilience integrator is needed to organize, integrate and harmonize industry sectors of the critical infrastructure into a resilient system of systems. The stakeholder vision for this project is an opportunity value proposition for operational resilience. If resilience is to be achieved, the resilience integrator must be prepared to provide resiliency engineering features capable of meeting stringent objectives.

The resilience integrator should harmonize the context and culture of the numerous industry sectors and anticipate domain engineering clashes in order to avoid unintended operations results stemming from diversity in management, process, and engineering approaches. The resilience integrator should groom intelligent middlemen to facilitate the adoption of the way of working within the industry sectors of the critical infrastructure. The resilience integrator then shall facilitate the resilience maturity of management, process and engineering

Figure 2. Software Systems Architecture for Critical Infrastructure Resilience



capabilities and solutions that address security, continuity, survivability and resilience among the industry sector system of systems. The resilience integrator shall specify a system-of-systems architecture that facilitates the harmonious cooperation among industry sectors; provides digital situation awareness; allows for distributed supervisory control under stress; and manages the assembly, delivery and control of common system assets.

The resilience integrator shall prepare and coordinate a Resilience Integration Program Plan harmonizing, facilitating, specifying, engineering, developing, integrating and fielding the critical infrastructure system of systems. The resilience integrator shall frame a way of working to manage the communication, command, control, commitments and performance between the industry sectors, their contractors and the resilience integrator—including executive councils, steering groups, working groups and support groups. The resilience integrator shall calculate resilience risk based on Earned Value Analytics.

Intelligent Middlemen

If the critical infrastructure is to be resilient, its sector managers and systems must respond to guidance from intelligent middlemen whose influence is felt before, during and after a crisis. Intelligent middlemen possess the broad range of hard and soft skills that span the cultural, ethical, legal, business, process, management and engineering dimensions to meet the critical infrastructure challenges in anticipating, avoiding, minimizing, withstanding and recovering from crosscutting effects and to impede the emergence of propagating and cascading effects.

The intelligent middlemen are positioned at the center of things as the traffic cops for identifying and driving resolution of crosscutting issues. From this vantage point, the intelligent middlemen are able to obtain superior situational awareness. For example, they ensure that recovery time objectives are coordinated, interoperability protocols are followed, distributed supervisory control functions are coordinated, and operation sensing and monitoring functions are applied.

The Maturity Framework for Assuring Resiliency Under Stress provides the way to harmonize operations and deliver value through management, process, and engineering capabilities and solutions that address security, continuity, survivability and resiliency. The system perimeter focus areas include commitment to a business case, security in depth, business continuity, and systems survivability. Beyond that, the essential focus areas needed to extend the system perimeter to system-of-systems resiliency include coordinated recovery time objectives, interoperable information and data exchange, operation sensing and monitoring, distributed supervisory control, and information and data recovery. To achieve maturity in the assurance of resiliency under stress, the enterprise must satisfy the goal-based argument at each level.

Critical Infrastructure Resilience Architecture

The Software Systems Architecture for Critical Infrastructure Resilience calls for the following allocation of control, functions and persistent data, and assets (Figure 2). The situation system is populated with the man-made Critical Infrastructure Sectors and the intelligent middlemen control node. Each industry sector will register its profile in order to engage with the services of the respondent system.

The respondent system is populated with the system-of-systems resiliency engineering mission focus areas intended to interact with the situation system and its intelligent middleman in anticipating, avoiding, withstanding, mitigating, and recovering from the effects of adversity under all circumstances of use.

The system assets is populated with the facilities focus areas and their services to be instantiated by the respondent system in its interaction with the situation system and its critical infrastructure sectors.

More specifically:

- (1) The critical infrastructure situation system is composed of utilities and energy, banking and finance, medical systems, transportation, and telecommunications as well as public health, food and agriculture, federal agency, regional response,

Table 1. Resilience Risk and Earned Value Calculation

Assurance Evidence (Weighted Example)	Risk Indicator (Score 1-5)	Indicator Weight	Electrical Sector	Telecom Sector	Banking & Finance Sector	Transport. Sector	Medical Sector	Weighted Score	Earned Value	Risk
Sector Weight			5	4	3	3	2			
A. Culture and Content Harmonization	164	4	800	624	468	312	160	2,364	0.6952	0.3048
B. Intelligent Middlemen	98	2	240	292	144	84	48	708	0.8329	0.1671
C. Resiliency Maturity	70	5	325	260	240	210	140	1,175	0.6911	0.3089
D. System of Systems Architecture Adoption	38	5	200	160	129	105	70	655	0.5137	0.4863
E. Integration Engineering	57	2	130	104	72	60	36	402	0.5911	0.4089
F. Way of Working	141	3	420	336	333	234	132	1,455	0.7132	0.2868
G. Resilience Assurance and Risk Calculation	77	2	170	136	102	78	52	538	0.5274	0.4726
H. Cyber-security Strategy and Tactics	78	3	240	192	162	126	84	804	0.5254	0.4746
Total Indicators	723		2,525	2,104	1,641	1,209	722	8,101	0.6483	0.3517

emergency response, and intelligent middlemen control node. Each sector of the Situation System is composed of control, functions and persistent data, and assets local to the sector.

(2) The respondent system is engineered as a system-of-systems architecture composed of coordinated recovery time objectives, interoperable information and data exchange, operation sensing and monitoring, digital situation awareness, distributed supervisory control, and information and data recovery. The respondent system is composed of the control, functions and persistent data, and assets of the global system of systems.

(3) The system assets include services and facilities to be instantiated by sector: Enterprise Security Commitment Management Services, Enterprise Business Process Continuity Services, and System Survivability Engineering Services. The system assets are composed of the facilities and service assets made available to the situation system and its sectors by the respondent system.

Risk Calculation Worksheet

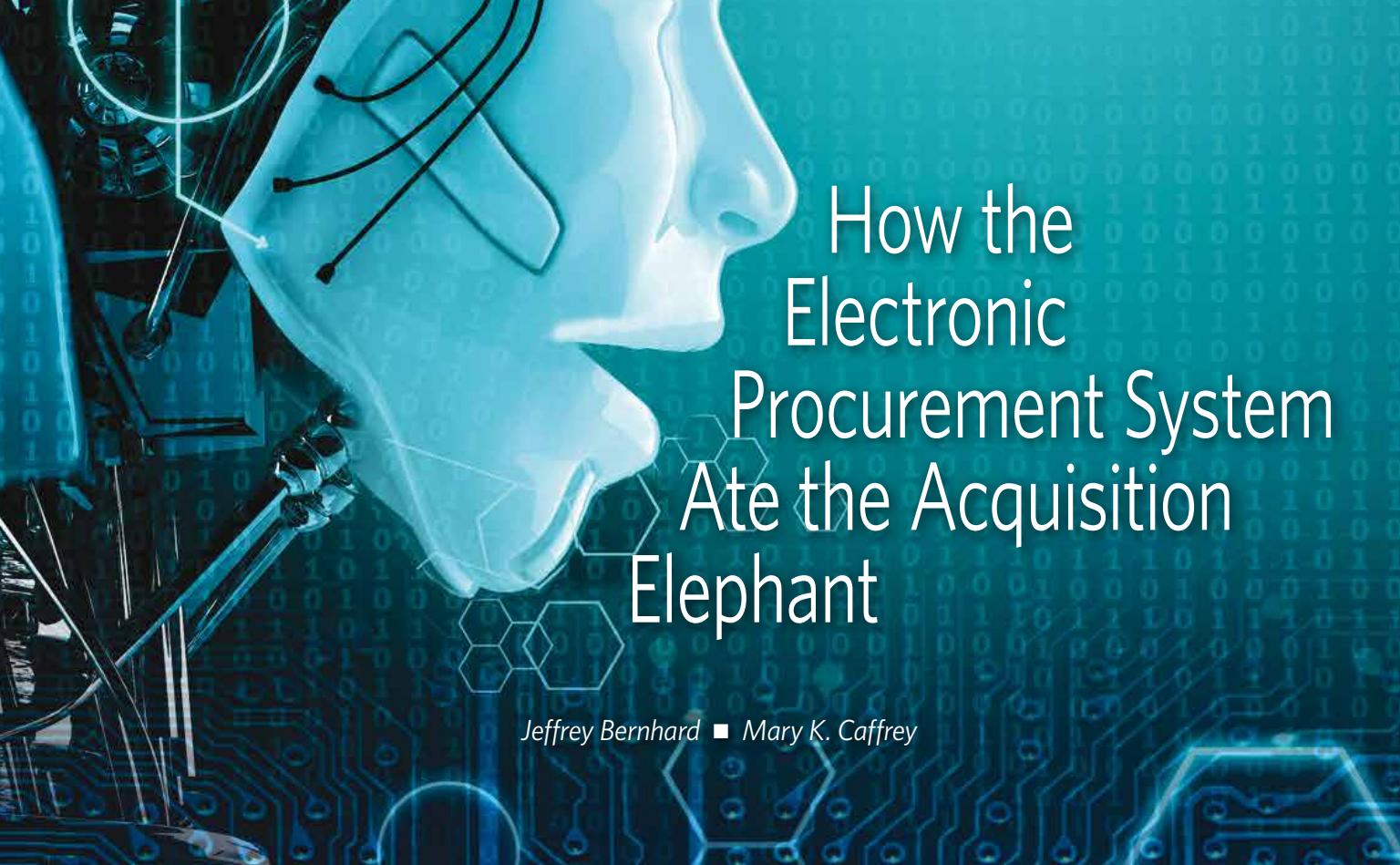
The Resilience Risk and Earned Value Calculation worksheet (Table 1) is intended to provide a useful point of reference. The worksheet is used to compile the assurance evidence element scores of risk indicators for each of five industry sectors. Each indicator is scored 1 (low) to 5 (high). Both the assurance evidence elements and the industry sectors are assigned weights of 1 to 5. This Critical Infrastructure Resilience dashboard is intended to shine a spotlight on resilience risk and earned value in order to reveal gaps, suggest vulnerabilities and point the way forward for participating industry sectors.

The Way Forward

So there we have the user story for Critical Infrastructure Resiliency. Resiliency is the High Ground... claim it! Make your move!



The author can be contacted at oneilldon@aol.com.



How the Electronic Procurement System Ate the Acquisition Elephant

Jeffrey Bernhard ■ Mary K. Caffrey

The answer to tackling any large federal acquisition resides in the old adage of "How do you eat an elephant? One bite at a time." We ignore the advice "one bite at a time" and in doing so, are consumed by the Department of Defense (DoD) acquisition process.

Tackling an Acquisition Category (ACAT) I program with its cornucopia of required acquisition documentation and full menu of processes and reviews in one bite seems insurmountable at best and, at worst, impossible to achieve. However, if you view "eating the elephant" as an opportunity to modify and streamline the acquisition process in order to obtain more comprehensive results (one bite at a time), then the "elephant" becomes much easier to consume.

If you are fortunate enough to stand up an acquisition program, you have a unique opportunity that expands both knowledge and experience. Removing the burden of legacy decisions provides the perfect opportunity to mold the program from your perspective. This article discusses the tailored acquisition approach of a

Bernhard, an acquisitions analyst for the Navy Enterprise Business Solutions (EBS) Program Management Office (PMO), is a former Navy Supply Corps Officer. He served in various assignments as Supply Officer Afloat and as Staff N4 Contracting and Logistics Officer for U.S. Naval Forces Alaska and Coast Guard District 17. He has been an acquisitions analyst at several DoD Program Offices. **Caffrey**, a Navy EBS PMO acquisition manager, is a former naval officer and program manager for the Navy's overseas network (ONE-NET) that serves the business and operational needs of 133,000 Navy users in Europe and the Middle East and Far East. She previously was Commanding Officer, U.S. European Command Navy Reserve Detachment 130 in Stuttgart, Germany, and vice president for a defense firm supporting Army acquisition management in Washington D.C. She has worked with the PEO Enterprise Information Systems since 2007.



It is important to note that any program seeking to tailor programmatic requirements must secure approval from a Milestone Decision Authority (MDA) via an Acquisition Decision Memorandum prior to implementing any tailoring methods.

commercial-off-the-shelf (COTS) solution for the Department of the Navy (DoN) Electronic Procurement System (ePS), a Major Automated Information System and an ACAT IAC Defense Business System (DBS).

Ask anyone to describe the DoD Acquisition Program Life Cycle and the response probably will reference the DoD Instruction rather than provide a succinct, descriptive answer. Instead of a deep dive into acquisition regulations, let's look at the beginning phases of the acquisition life cycle and highlight the DBS management activities accomplished by Navy Enterprise Business Solutions (PMW 220).

The point where a program officially begins depends on how much preliminary work has been accomplished on it. Ideally, a DBS program begins strategizing about acquisition tailoring early in the Materiel Solution Analysis (MSA) phase. It is accepted business practice to tailor all acquisition programs wherever possible to improve cost, schedule and performance.

Navy ePS grew out of a need to revitalize or replace the existing DoD Contract Writing System (CWS), known as the Standard Procurement System (SPS), used by every Service. The DoD developed and deployed SPS in the late 1990s. With increases in program and contract sizes, the DoN needed a new, fully integrated and auditable CWS. The MSA phase identified an estimated 723 distinct requirements. Market research confirmed that several COTS solutions could fit the bill. An analysis by the ePS team determined that a COTS solution could eliminate a large portion of the Technology Maturation phase. This set the stage for the ePS program to embrace a proactive tailored approach as an official part of its Acquisition Strategy. It is important to note that any program seeking to tailor programmatic requirements must secure approval from a Milestone Decision Authority (MDA) via an Acquisition Decision Memorandum prior to implementing any tailoring methods. With this in mind, the ePS team set out to identify the regulatory and/or statutory documents that would be candidates for a waiver or tailoring. The team researched tailoring methods and decided to implement a dynamically tailored acquisition approach that included a modified Acquisition Model 3,

combined technical reviews, and integrated the Developmental and Operational Test phases.

Documentation tailoring began with regulatory documentation requirements for the Request for Proposal-Release Decision (RFP-RD) point. The most significant tailored requirement was combining the Acquisition Strategy and Acquisition Plan (AS/AP) into one document. The combination of these very similar documents, rather than staffing two separate acquisition documents, saved time and manpower.

The Capability Development Document and Capability Production Document were replaced by the Capability Requirements Document (CRD). Signed on Feb. 4, 2016, the CRD was a significant accomplishment for the ePS team. CRD approval means that the program can use System Performance Measures (SPMs) instead of the Joint Capabilities Integration and Development System Key Performance Parameters. SPMs capture the minimum operational effectiveness and suitability attributes required to achieve the overall desired capabilities for ePS. SPMs also contain threshold and objective values verifiable by testing and other analysis. Since ePS will be DoN-specific, joint requirements are not necessary. This also meant ePS would not be a Joint Requirements Oversight Council (JROC) interest program or subject to JROC oversight.

As the ePS program continued to proceed, other documentation fell into place. A rough order of magnitude (ROM) cost estimate was developed in October 2016 in lieu of an independent cost estimate. The Cost Analysis Requirements Document, Life Cycle Sustainment Plan, Program Protection Plan, which includes the Cybersecurity Strategy and System Engineering Plan, were all approved at the Program Manager or Program Executive Office level by Dec. 5, 2016.

The ePS team tailored the acquisition approach in coordination with the Service Acquisition Executive and the Office of the Secretary of Defense (OSD), with approval from the MDA. It is important to note, that Frank Kendall, then the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]), stated that, "tailoring should and could be discussed in the Acquisition Strategy." The comment granted ePS the flexibility to pursue innovative tailoring methods as

Origin of the Navy's ePS

The idea for a Navy ePS grew out of a need to revitalize or replace CWS, known as the Standard Procurement System (SPS), developed and deployed by the DoD in the 1990s for the military. SPS has been the DoN's primary contract writing system and contracting data exchanger. Initially developed for simplified acquisitions, today SPS issues more than 75 percent of DoN contracts and modifications.

Patched and updated several times to increase its longevity and usefulness, SPS was never intended for complex major contracts. The need for revitalization or an entirely new system was quickly becoming more apparent. The Navy needed a new contract writing capability, able to meet the contract writing requirements of the 21st century for effective deal initiations, management, termination, close out, and auditability across the full spectrum of Navy and Marine Corps contracting environments.

Recognizing the need for a new or updated CWS, the USD(AT&L) initially directed the development of a new CWS and a halt in the use of SPS by Sept. 30, 2017. That date has been revised to no new awards, agreements, or orders by Sept. 30, 2020, with the system to "sunset" by Sept. 30, 2023. Military departments and agencies were delegated the responsibility to fund, develop and field a replacement CWS within the DoD Business Enterprise Architecture (BEA) boundaries while ensuring data standardization, electronic data transfer, and data visibility across all relevant systems.

In addition to its use as a CWS, Navy ePS will also serve as the DoN's system of record for the official contract file. The system will have the flexibility to interface with Navy, the DoD and federal electronic systems as needed to meet all stakeholder requirements. Data captured through system automation and distributed through interface transactions are critical elements in supporting the DoN's Financial Improvement Program and enabling the DoN's vision of clean financial statements. The ePS also will comply with the National Defense Authorization Act of 2013 direction that DoD writes all contracts electronically by 2018.

The Program began at the MSA phase with the Analysis of Alternatives (AoA) Study Plan in September 2012, followed

a few months later by the AoA in 2013. Navy ePS achieved a Materiel Development Decision on April 1, 2013. The Navy Resources and Requirements Review Board approved the ePS AoA in May 2014. The preferred alternative in the AoA is a COTS CWS with COTS middleware that provides an interfacing capability for the CWS, allowing integration and maintenance in the DoN enterprise. Following the AoA's recommendation, the program intends to invest in a COTS solution, supplemented by gap-closures methodologies such as Business Process Management tools and COTS middleware.

The ePS will provide the DoN with standardized, comprehensive end-to-end (E2E) contract management for services, supplies and construction. The ePS also will support mission-related assistance using assistance agreements, such as grants, and will deliver the following functional/technical capabilities:

- Provide robust functional capabilities to support the E2E Procure-to-Pay process.
- Capture data at the source (i.e., no redundant data entry via touch labor).
- Leverage a data-centric and standard-compliant design for data storage and exchanges.
- Enforce business process controls and system controls to support an unqualified audit opinion.
- Inform decision making through available, accurate, timely and visible reporting.
- Comply with DoN-specific architecture and environmental constraints (e.g., Navy Marine Corps Intranet).
- Deliver a flexible solution that allows prompt and cost-effective changes.
- Support 100 percent of the DoN contracting actions in a fully auditable and traceable environment.
- Provide a secure computing environment that implements critical security controls and capabilities.

The result of a successful Navy ePS implementation will be a contracting process workforce that is well informed and completely empowered to write accurate and timely contracts in support of the warfighter, including management of the data flows into and out of the deal-making space.

deemed appropriate, yet required the full documentation and justification of those methods in the AS/AP, for review and approval by the MDA.

With Kendall's support in hand, the tailoring approach was set and Navy ePS marched toward issuing a RFP. As a result of the early groundwork, program events were accomplished in quick, rapid-fire succession. Gate 3 was completed on May 3, 2016. Gate 4 was completed June 1, 2016. Gate 5 was completed Dec. 20, 2016. The effective tailoring by the ePS team resulted in a favorable RFP-RD by the MDA on Jan. 18, 2017, and signature approval of the combined AS/AP on Jan. 24, 2017. Also, James A. MacStravic, performing the duties of the USD(AT&L), reclassified ePS as an ACAT IAC acquisition program and delegated

MDA responsibility to the Secretary of the Navy on March 20, 2017. Navy ePS now stands ready to release the RFP to industry sometime between late in the second quarter and early in the third quarter of Fiscal Year 2017.

Navy ePS follows the Acquisition Model 3 for incrementally deployed software intensive programs. However, since ePS was planning on a COTS solution, the ePS team streamlined Model 3 to use only one increment with several releases, instead of the multiple increments and subsequent builds that are more commonly performed. The single increment would contain a Limited Deployment (LD), a Release 1, a Release 2, and a Full Deployment (FD). The ePS team also concluded that an Authority to Proceed could replace the Milestone B Decision review.

The ePS team learned myriad lessons during this stage of the development and execution of its tailoring approach—and captured them in a database for future activities and socialization among other program teams.

To keep all parties abreast of evolving tailoring activities, the ePS team held recurring Acquisition and Engineering Working Integrated Product Team meetings with DoN-OSD stakeholders. This mitigated program risk and allowed stakeholders swift access to a COTS solution, resulting in accelerating the projected program schedule. Working sessions occurred as part of the documentation development process to address significant issues early in the process and to get real-time stakeholder buy-in. This approach enabled timely resolution and response to significant and critical issues as they arose.

The ePS team learned myriad lessons during this stage of the development and execution of its tailoring approach—and captured them in a database for future activities and socialization among other program teams.

Program Offices engaging in a DBS should apply the following lessons early as activities may take nearly 12 months to complete, and documentation requirements may change during the development and staffing process. The three key lessons

learned are (1) allow sufficient time to staff and process acquisition documents; (2) develop standard templates, illustrations and identify responsible parties; (3) and collaborate across functional areas to ensure production of greater descriptive depth and well-written requirements and documents.

The ePS program is poised to deliver an automated DoN CWS that adheres to DoD Information Technology business principles and fulfills congressionally mandated auditability and Financial Improvement and Audit Readiness (FIAR) requirements. In conclusion, the Navy ePS tailored acquisition approach is proactive, innovative, and fully supports DoD acquisition instructions and DoD Better Buying Power 3.0 tenets. The approach encourages thoughtful planning and early program assessment to minimize unnecessary bureaucracy and low-value added processes in major investment decisions supporting delivery of vital operational capability to the warfighter. &

The authors can be contacted at Jeffrey.bernhard@navy.mil and marykay.caffrey@navy.mil.

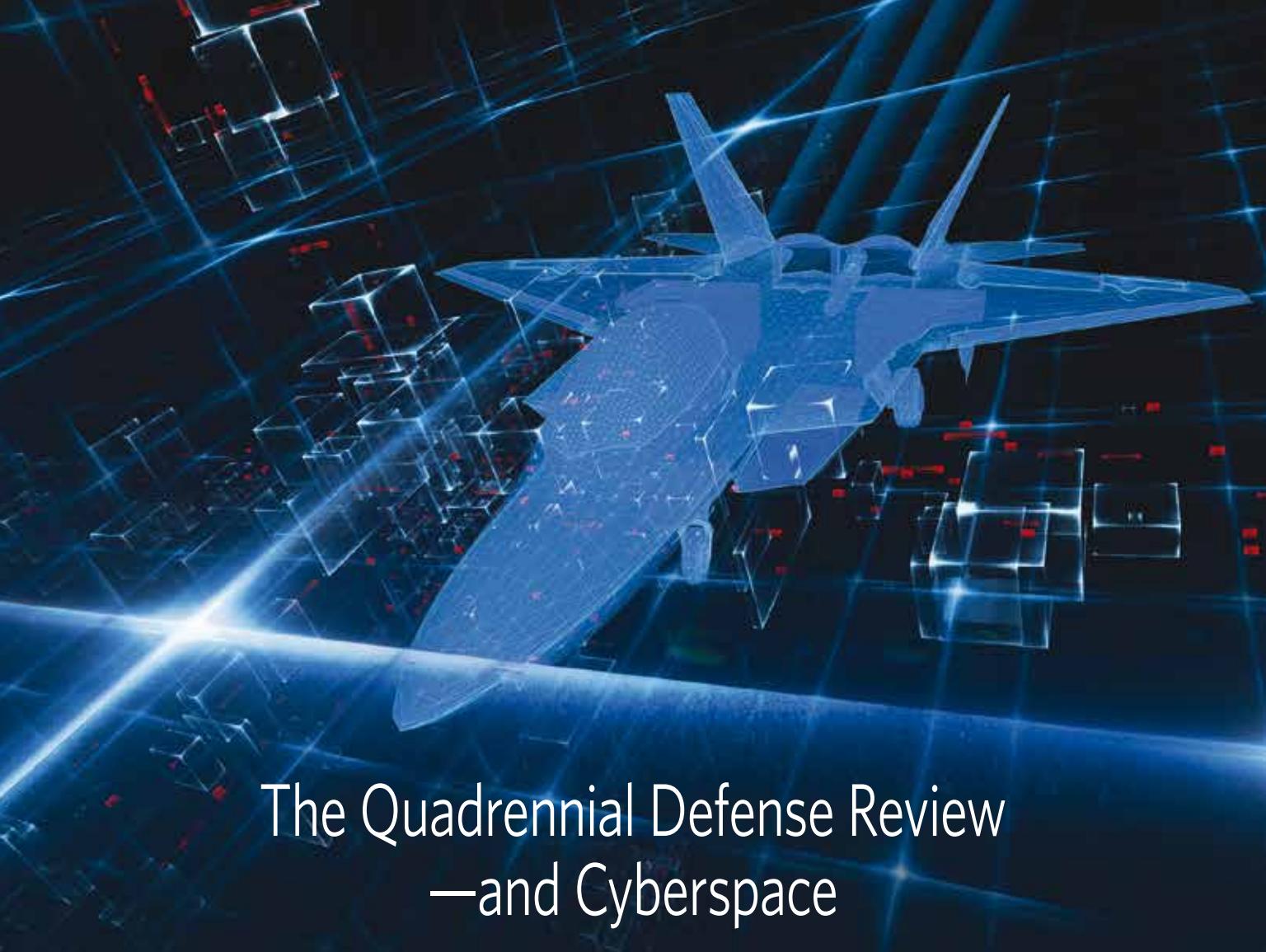
Expand Your Network

Acquisition Tools and Resources
Where the Defense Acquisition Workforce Meets to Share Knowledge

<https://shortcut.dau.mil/JST/productsupport>

- Available 24/7
- More than 40 different acquisition-related Communities of Practice and Special Interest Areas
- Access to policies, guidance, tools, and references
- Automatic notification of new content (by subscription only)
- Ability to tap into the wisdom of the community
- Interact, share resources, ideas, and experiences with fellow practitioners across DoD and industry

ACC



The Quadrennial Defense Review —and Cyberspace

Jennifer Miller, D.B.A.

The latest Quadrennial Defense Review (QDR) focused on cyberspace and the projected approach of the Department of Defense (DoD) to preparing and performing in cyberspace. This article considers cyberspace relative to possible, major implications for airpower in future contingency operations, including a shift in focus on the U.S. Air Force's five core missions, an increased emphasis on cyberspace warfare, and a consistently high demand for cyber talent.

Most higher-ranking DoD officials know about the key documents in the planning phase of the Planning, Programming, Budgeting, and Execution (PPBE) process, which is taught as part of the DoD Decision Support System. The system also includes the Defense Acquisition System (DAS) and the Joint Capabilities Integration

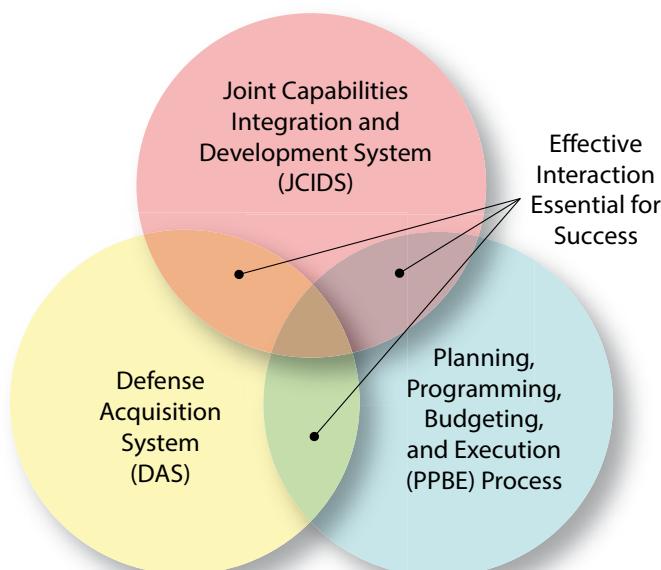
Miller is a deputy branch chief and cost analyst of the National Guard Bureau Headquarters' Joint Staff in Virginia, where she serves both the Army National Guard and Air National Guard. She earlier supported the Air Force and Army at installations along the East Coast. She is a Certified Government Financial Manager and a Certified Defense Financial Manager with an acquisition specialty. Miller received her doctorate of business administration from Walden University's College of Management and Technology.

and Development System (JCIDS). The QDR, a key PPBE document, provides a strategic framework of future plans for programmers, budgeteers and the personnel executing the PPBE process phases.

As I completed the U.S. Air Force's non-master's degree program of the Air Command and Staff College, I had opportunities to reflect on the reviews and strategic projections of the defense community. One pivotal document incorporated in an essay assignment related the QDR to cyberspace. Those working with cyber probably realize it is a constrained, costly and complex area—from the technology assets to the people involved. With airpower and the future in mind, I considered major and high cost implications that await those involved.

The 2014 QDR, produced in compliance with U.S. Code, Title 10, Sec. 118 (a), reviewed the DoD strategy and priorities to provide that "modern warfare is evolving rapidly, leading to increasingly contested battlespace in the air, sea, and space domains—as well as cyberspace—in which our forces enjoyed dominance in our most recent conflicts." Given these assertions of modern warfare, I believe the major implications for airpower in future contingency operations include a shift in focus on the Air Force's five core missions, an increased emphasis on cyberspace warfare, and a consistently high demand for cyber talent. This may mean a variety of micro- and macroeconomic approaches including more sign-on bonuses, retention pay, and other initiatives taken to attract and retain the special skillsets of the critical and constrained cyber workforce in conjunction with yet-to-be imagined technological solutions. My beliefs in these major implications for airpower in future contingency operations are supported and defended

Figure 1. The DoD Decision Support System



Source: DAU Acquipedia.
<https://dap.dau.mil/acquipedia>

with observations made by glancing to the past and grasping the present circumstance.

The Air Force's current core missions stemmed from those founded in 1947, but a shift in content and application demonstrates the evolution I project for the future. That evolution will entail a shift in focus among the five Air Force core missions with paramount focus on the core missions of air and space superiority—and on intelligence, surveillance and reconnaissance (ISR). I believe these two core missions will be two of greater or equal focus compared to command and control (C2) with the final two core missions of rapid global mobility and global strike of the least focus. My projections of this shift in focus as an implication for airpower in future contingency operations are inspired by authors such as Dr. Benjamin S. Lambeth (see "Airpower, Spacepower, and Cyberpower," in the January 2011 issue of the *Joint Force Quarterly*) who has described the battlespace dominance challenges cyberspace invites for established forces with decades of dominance and irregular warfare actors with limited histories who conduct operations using rudimentary means. From a PPBE perspective, I see some major shifts and conflicts between what has been set in place in the programming phase of the PPBE process and what will be budgeted and executed by directives from a new administration rapidly approaching the production of its own QDR. This shift should produce a surplus in some programs, perhaps enough to offset the areas of greater focus that await programmer adjustment.

The cyberspace domain also seems limitless given the man-made, malleable terrain. Cost analysts and estimators won't assess transportation costs or a great many new weapons because cyberspace is more of an idea than a fungible good or readily categorized service. From the domains most frequented and readily recognized in the Air Force's core missions, I view cyberspace as the most rapidly evolving of modern warfare domains. Hence, the contested battlespace stakes are highest while the entry barriers are the lowest. As a result, this domain presumably receives the greatest focus in both contingent and localized operations. These vast comparisons of highs and lows were described by Eric Sterner in his article on "Retaliatory Deterrence in Cyberspace," in the March 1, 2011, issue of the George C. Marshall Institute's *Science for Better Public Policy*.

A second major implication for future airpower contingency operations is the increased emphasis on cyberspace warfare. Concerns about cyber warfare resemble those surrounding nuclear threats and attacks in prior decades; however, the idea of mutually assured destruction that deterred nuclear warfare does not possess as much weight in cyber war. The 2014 QDR outlined characteristics of the Joint Force and current dominance in cyberspace but explicitly mentioned sustainment priorities in science and technology along with steps to continue progress in combating "full-spectrum cyberspace capabilities" to counter increasing challenges to continued U.S. dominance. In my opinion, this full-spectrum of cyberspace includes the

individuals, hardware, software, networks, technologies and asymmetrical activities. As you can imagine, the unknown equates to a great many risks, and cost estimates will reflect those risks in terms of higher costs. Furthermore, cyberspace is a global domain in an information environment with inter-dependent networks in a terrain unlike those of ground, sea and air operations in past conflicts.

Cyberspace also extends to the private sector and among global partnerships and lacks geographic boundaries. Efforts to deal with cyberspace concerns also have included "innovative approaches to how we fight, how we posture our force, and how we leverage our asymmetric strengths and technological advantages" as part of addressing the complex cyberspace warfighting environment outlined in the QDR. The repeated use of "how" in our cyberspace concerns and

advancements" and public sector entities seem increasingly reliant on commercial-off-the-shelf (COTS) technologies that risk the vulnerabilities recorded in Annex 3-12, Cyberspace Operations. The value of private industry personnel is demonstrated by the lack of career-broadening possibilities for DoD personnel in cyber career fields: There are significant education requirements, and experience would be difficult to attain for a guaranteed return on investment.

In addition, the man-made nature of the cyber domain contributes to the dynamic quality and uniqueness of the unusual terrain that must be navigated and mastered. The implication for airpower in future contingencies means there is a need for highly and continually trained and competent personnel who have a enduring and passionate commitment to the work. This means, in turn, that there must be



The seemingly lawless cyber environment conflicts with legal guidance such as the law of armed conflict, as well as the morals, beliefs and ethics that a more junior cyber force may struggle to successfully navigate.

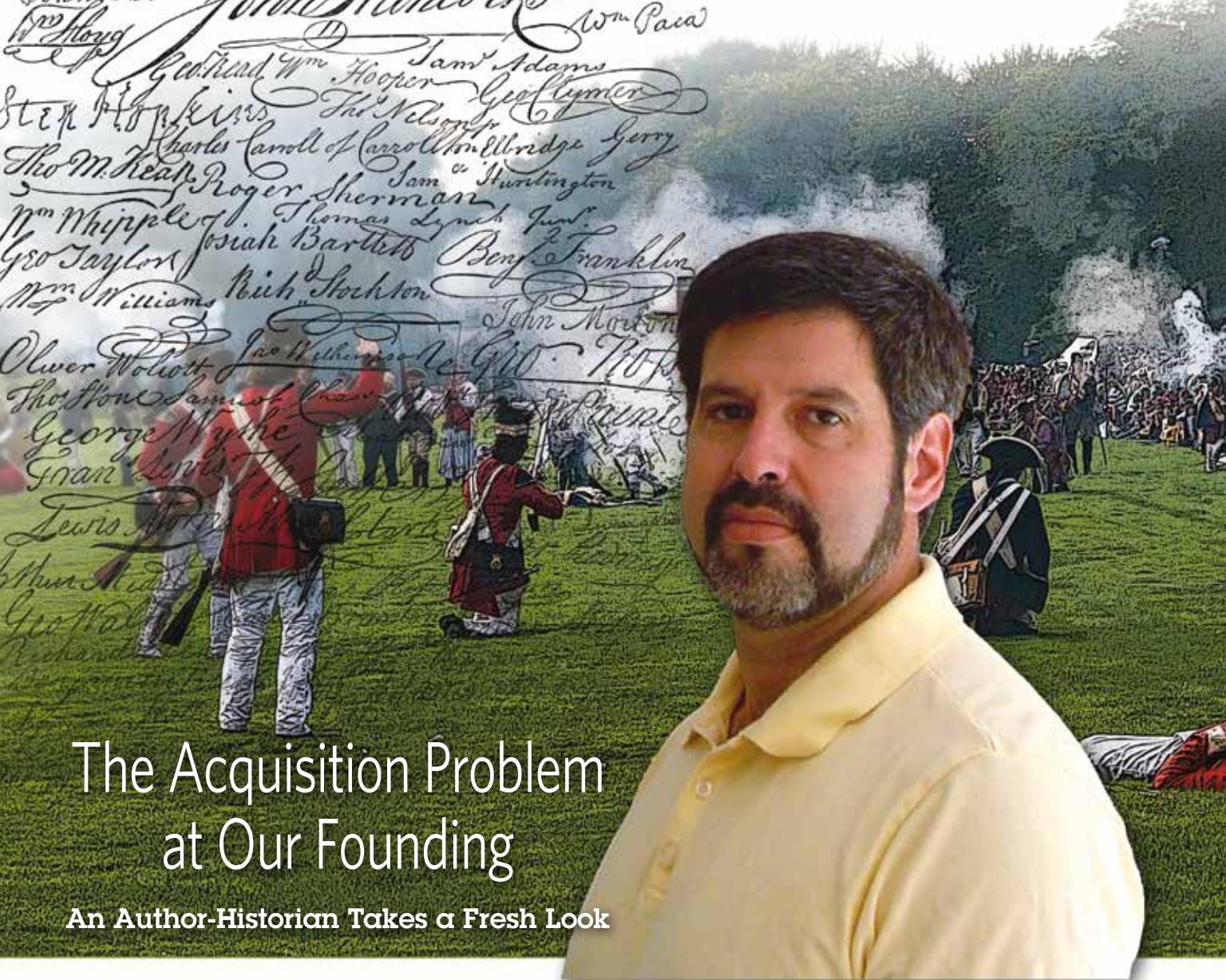
approaches to addressing cyberspace complexity illustrates the abundant options in the unique cyberspace war environment. The increased emphasis on cyberspace warfare also is evident in human resource and personnel matters. Again, money is only part of the equation for building and sustaining the cyber-capable workforce.

A final major implication for future contingency air operations is the anticipated, consistently high demand for cyber talent. It can be presumed the Air Force will maintain the lead in the cyber realm and cyber warfare, especially in contingencies, given the Air Force core mission of air and space superiority. This lead position automatically will impose on the Air Force the greatest burden of maintaining a cyber force. The 2014 QDR openly described how the DoD will invest in expansion of cyber capabilities including recruiting, training and retaining cyber personnel with specific mention of the DoD Cyber Mission Force, for which manning began in 2016. A potential example was reported by Steve Walsh on National Public Radio on Aug. 4, 2015. Walsh cited the National Guard cyber units where guardsmen maintain a private sector, full-benefit position, while serving their country with those same top-notch skills in a national defense capacity. The value of private industry personnel and expertise to airpower contingency operations cannot be overstated as private industry is said to constitute "the primary catalyst for technological

succession planning for on-the-job and continuous training in a rapidly changing environment. As described by retired Air Force Maj. Gen. Charles J. Dunlap in his article "Perspectives for Cyber Strategists on Law for Cyberwar," in the spring 2011 issue of the *Strategic Studies Quarterly*, the seemingly lawless cyber environment conflicts with legal guidance such as the law of armed conflict, as well as the morals, beliefs and ethics that a more junior cyber force may struggle to successfully navigate. As budget and personnel cuts persist, the struggle also continues.

Thus, assertions of the 2014 QDR highlight the rapid evolution of modern warfare to include cyberspace. I hypothesize that the major implications for future airpower contingency operations include a shift in focus on the Air Force's five core missions and potentially the other military Services' mission sets. This shift in core mission focus correlates with an increased emphasis on cyberspace warfare, and melds with a consistently high demand for cyber talent. The costs of the shifts and cyberspace focus will be substantial, but the planning has started. Now the burden rests on the programmers, budgeters and executing parties. My beliefs about these major were inspired by my studies for Air Command and Staff College as well as observations of current trends. &

The author can be contacted at jammrellim@yahoo.com.



The Acquisition Problem at Our Founding

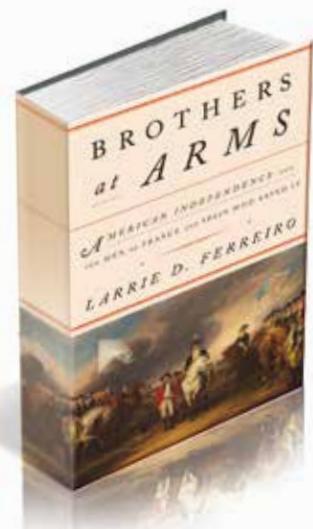
An Author-Historian Takes a Fresh Look

A small and relatively isolated country, distant from the centers of world power, struggles to establish independence and self-government—despite a critical shortage of up-to-date weapons and materiel. A great military power steps in and provides badly needed training and war supplies, and even troops and naval support, so that victory is no longer an elusive goal but a probable outcome.

Are we describing United States intervention in the Middle East? Or Asia? No. We are looking through the lens of history at our own nascence as an independent nation among nations and the story of French and Spanish support for our cause.

Larrie D. Ferreiro's recent book, "Brothers at Arms: American Independence and the Men of France and Spain Who Saved It," examines the role of the French, aided and abetted by the Spanish, in securing this country's independence by their intervention in our Revolutionary War and expansion of that conflict into other theaters. Our European

Above: The book's author, Larrie D. Ferreiro
Below: The book



allies supplied critically needed weapons (muskets and cannons) as well as ammunition, gunpowder, uniforms, and the naval forces that proved decisive in bottling up Lord Cornwallis' troops at Yorktown, Virginia—leading to the British surrender there. The 464-page book (\$30 per copy) was published by Alfred A. Knopf, New York, in November 2016.

At the time of our War for Independence, the British Colonies of North America primarily were agrarian societies, and their largest exports (usually through Britain, as required by law) consisted of raw resources: cotton, tobacco, hemp, furs, rice, indigo, dried fish, and a circular trade of rum and molasses involved in the Caribbean sugar islands' slave trade.

Most Americans are taught as schoolchildren of poorly outfitted Continental soldiers, armed perhaps with hunting weapons and fighting with their feet wrapped in rags, the winter at Valley Forge, and Washington crossing the Delaware to surprise Britain's Hessian troops and win victory at Trenton, New Jersey. But while it also is learned that European officers such as the French Generals Rochambeau and Lafayette, the Polish Generals Kosciuszko and Pulaski, and the Germans de Kalb and von Steuben afforded great help to the American cause, little usually is said about the general and dangerous shortage of weapons and ammunition or how the Revolution would likely have failed without material help from foreign nations. This was a critical problem despite the thousands of miles of ocean separating the Americans from their Colonial master, the preeminent naval power of Europe.

There were skilled gunsmiths in the Colonies, but each could produce perhaps only one musket per month. However, the major arms manufacturers of Europe could churn out battle-ready weapons by the thousands. As one visitor to Britain's industrial heartland noted, the factories of Birmingham alone produced "a prodigious amount for exportation ... annually above a hundred fifty thousand muskets".

But France, still smarting from its defeat at the hands of its longtime British rivals and the resultant loss of Quebec in the Seven Years' War little more than a decade earlier, saw an opportunity to redress the balance of power in its favor by intervening in the American war. Spain, allied dynamically with France, saw a ready-made opportunity to secure its own New World possessions against Britain's rising power.

Ferreiro contends that the primary purpose of our Declaration of Independence in 1776 was to enable America to secure French and Spanish support that would likely not have been fully forthcoming in a mere civil war between the Colonies and Mother England over the specific acts of Parliament. And the French, for their part, had anticipated such a revanchist opportunity would open for them in the New World even before the Americans fully embraced the idea of independence.

The Founders believed they could not expect the French and Spanish to deal with them as a sovereign people until they

From the Book's Introduction:

"The problem was that the new American nation had begun its war against British rule stunningly incapable of fending for itself, like a rebellious adolescent who takes leave of his family without a penny to his name. It had no navy, little in the way of artillery, and a ragtag army and militia that were bereft of even the most basic ingredient of modern warfare: gunpowder. Soon after the Battle of Bunker Hill, Benjamin Franklin noted that 'the Army had not five rounds of powder a man. The world wondered that we so seldom fired a cannon; we could not afford it.' America, in short, desperately needed to bring France and Spain directly into the war, the only nations powerful enough to carry the fight straight to the British army as well as to bring the British navy into a wider conflict that would draw it away from American shores and sap its strength.

"Both France and Spain had allowed clandestine aid to flow to the Americans since before the fighting started, but this was proving insufficient for the scale of the conflict. Neither Louis XVI nor Carlos III would openly take sides in a British civil war; America had to demonstrate that it was an independent nation fighting against a common British enemy. The document that emerged from under Jefferson's hand, clearly stating that 'these United Colonies are, and of Right ought to be Free and Independent States,' was in fact an engraved invitation to France and Spain asking them to go to war alongside the Americans."

had definitively proclaimed themselves as such. John Adams, no fan of foreign entanglements, admitted, "Foreign powers could not be expected to acknowledge us, till we had acknowledged ourselves as an independent nation." And Thomas Jefferson noted that "a declaration of independence alone could allow European powers to treat with us." It also is Ferreiro's belief that, despite the significant outlays in support of the Americans, including up to \$50 billion in fiscal aid in addition to weapons and supplies, our War of Independence was not the decisive element in the French fiscal crisis that led to their own Revolution shortly after ours. That crisis had long been brewing because of the deep indebtedness of the French state.

Ferreiro's book was a finalist in contention for the 2017 Pulitzer Prize in history and is an excellent read. Congratulations, Dr. Ferreiro.

Ferreiro is a naval architect and historian and holds a Ph.D. from the Imperial College in London, England. He teaches history at George Mason University and has written and edited several books on naval history. He also is research director at the Defense Acquisition University (DAU) and executive editor of *Defense AT&L*'s sister publication, DAU's *Defense Acquisition Research Journal*.

&

This article was compiled by the editors of Defense AT&L magazine.

LETTER TO THE EDITOR

"Tools for Deciphering Best Value" by William Sims Curry in the May-June 2017 issue of *Defense AT&L* magazine is an example of how, given enough time, viewpoints swing back to those held long before. A little more than 12 years ago, *Defense AT&L* published an article (in two parts) in the September-October and November-December 2004 issues on Best Value or Trade-off source selection methodology. In 2004, this form of source selection was not commonly used across the acquisition community; instead, the very quantitative scoring system propounded by Mr. Curry was much more the norm.

What is described now as a weakness was, in 2004, described as a strength. It is best understood that no one single process will be the best for all situations. But that is what we all too often try to do. I will state that there are source selections where the quantitative methods of source selection may be the best, and the particular case cited by the article appears (as presented) to be one of those scenarios. But, for a very complicated technical evaluation, I would suggest that quantitative methods are not going to be the best solution. Several things involved lend credibility to my statement.

One is that—even just talking about a weapon system's technical side—if everything is going to add up to 100 percent for total weighting, one of two things will be the case: Either no technical requirement will have a very high weight or some of the technical requirements will have such little weighting as to make us ask why we should bother to evaluate this. And that only increases when you add the nontechnical areas of management, risk, cost and past performance.

The second thing is that requirements interrelationships are not necessarily static. By itself, the technical requirement may have a relative importance of A, B and C. However, if you are able to achieve objective values of all three, there may be a synergistic effect and the total overall impact of all three proves to be greater than A+B+C.

Now, let's consider that some performance values may be worth a higher cost. That sort of messes with the value accorded to cost and price. So, there was a reason we started switching in the early 2000s to the greater use of non-quantitative best value, "squishy" as it may seem.

One last point. Let's look at a sentence from the article's conclusion: "DoD would benefit from use of the TWS [Total Weighted Score] contractor selection process that distinctly identifies the contractor offering the best value proposal, simplifies the technical/cost trade-off decision, and inhibits procurement corruption." Let's particularly look at the last

part: "... and inhibits procurement corruption." Let's face it: If we have a real problem with procurement corruption, we have some fundamental issues that no single source selection method will cure. There is a way around any single system. It's just a matter of having enough motivation to find it.

Respectfully,

Alexander R. Slate
Project Management Professional

(The letter writer is a retired Air Force civilian, with more than 30 years of experience supporting acquisition in a number of different capacities [project manager, test, engineering, research scientist, and acquisition facilitator]. He previously worked for the Brooks Air Force Base Center for Acquisition Excellence in San Antonio, Texas.)

NOTE FROM THE EDITOR

Defense AT&L magazine encourages its readers to comment and contribute to the ongoing discussion in these pages of defense acquisition.

MDAP/MAIS Program Manager Changes

With the assistance of the Office of the Secretary of Defense, *Defense AT&L* magazine publishes the names of incoming and outgoing program managers for major defense acquisition programs (MDAPs) and major automated information system (MAIS) programs. Below are listed the leadership changes reported for both civilian and military program managers in March and April 2017.

Navy/Marine Corps

CAPT John Dougherty relieved **CAPT Jaime Engdahl** as program manager for Precision Strike Weapons (PMA 201) on March 23.

CAPT Paul Mitchell relieved **CAPT Ralph Lee** as program manager for the Strike Planning and Execution Systems Program Office (PMA 281) on March 3.

Dr. Regan Campbell relieved **CAPT Daniel Brintzinghoffer** as program manager for the Frigate Program Office (PMS 515) on April 7.

WRITERS' GUIDELINES IN BRIEF

Purpose

Defense AT&L is a bimonthly magazine published by DAU Press, Defense Acquisition University, for senior military personnel, civilians, defense contractors and defense industry professionals in program management and the acquisition, technology and logistics workforce.

Submission Procedures

Submit articles by e-mail to datl@dau.mil. Submissions must include each author's name, mailing address, office phone number, e-mail address, and brief biographical statement. Each must also be accompanied by a copyright release. For each article submitted, please include three to four keywords that can be used to facilitate Web and data base searches.

Receipt of your submission will be acknowledged in 5 working days. You will be notified of our publication decision in 2 to 3 weeks. All decisions are final.

Deadlines

Note: If the magazine fills up before the author deadline, submissions are considered for the following issue.

Issue	Author Deadline
January-February	1 October
March-April	1 December
May-June	1 February
July-August	1 April
September-October	1 June
November-December	1 August

Audience

Defense AT&L readers are mainly acquisition professionals serving in career positions covered by the Defense Acquisition Workforce Improvement Act (DAWIA) or industry equivalent.

Style

Defense AT&L prints feature stories focusing on real people and events. The magazine seeks articles that reflect author experiences in and thoughts about acquisition rather than pages of researched information. Articles should discuss the individual's experience with problems and solutions in acquisition, contracting, logistics, or program management, or with emerging trends.

The magazine does not print academic papers; fact sheets; technical papers; white papers; or articles with footnotes, endnotes, or references. Manuscripts meeting any of those criteria are more suitable for DAU's journal, *Defense Acquisition Research Journal (ARJ)*.

Defense AT&L does not reprint from other publications. Please do not submit manuscripts that have appeared elsewhere. Defense AT&L does not publish endorsements of products for sale.

Length

Articles should be 1,500–2,500 words.

Format

Send submissions via e-mail as Microsoft Word attachments.

Graphics

Do not embed photographs or charts in the manuscript. Digital files of photos or graphics should be sent as e-mail attachments. **Each figure or chart must be saved as a separate file in the original software format in which it was created.**

TIF or JPEG files must have a resolution of 300 pixels per inch; enhanced resolutions are not acceptable; and images downloaded from the Web are not of adequate quality for reproduction. Detailed tables and charts are not accepted for publication because they will be illegible when reduced to fit at most one-third of a magazine page.

Right to Use Illustrations

Non-DoD photos and graphics are printed only with written permission from the source. It is the author's responsibility to obtain and submit permission with the article. **Do not include any classified information.**

Author Information

Contact and biographical information will be included with each article selected for publication. Please include the following information with your submission: name, position title, department, institution, address, phone number and e-mail address. Also, please supply a short biographical statement, not to exceed 25 words. We do not print author bio photographs.

Copyright

All articles require a signed Work of the U.S. Government/Copyright Release form, available at https://www.dau.mil/library/defense-atl/Lists/PageContent/Attachments/6/DATLcopyright-release_032217.pdf. Fill out, sign, scan and e-mail it to datl@dau.mil or fax it to 703-805-2917, Attn: Defense AT&L.

Alternatively, you may submit a written release from the major command (normally the public affairs office) indicating the author is releasing the article to Defense AT&L for publication without restriction.

The Defense Acquisition University does not accept copyrighted material for publication in Defense AT&L. Articles will be considered only if they are unrestricted. This is in keeping with the University's policy that our publications be fully accessible to the public without restriction. All articles are in the public domain and posted to the University's website, <https://www.dau.mil>.